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San Francisco, Calif.

November 15, 1925
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Journal of Electricity

Devoted to the Economic Production and Commercial Application of Electricity
IN THE ELEVEN WESTERN STATES

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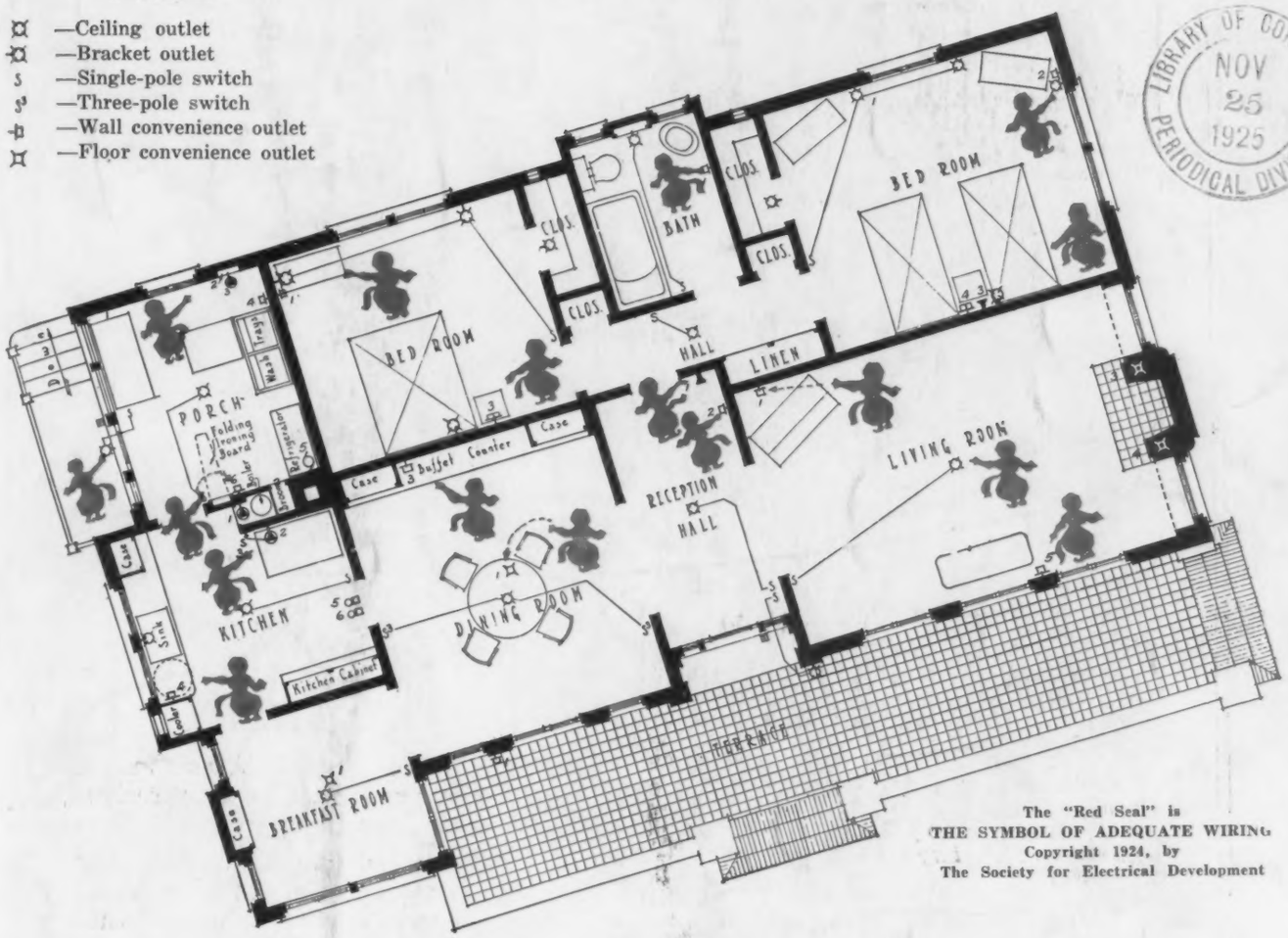
PERIODICAL DIVISION

SYMBOLS

- —Ceiling outlet
- —Bracket outlet
- —Single-pole switch
- —Three-pole switch
- —Wall convenience outlet
- —Floor convenience outlet



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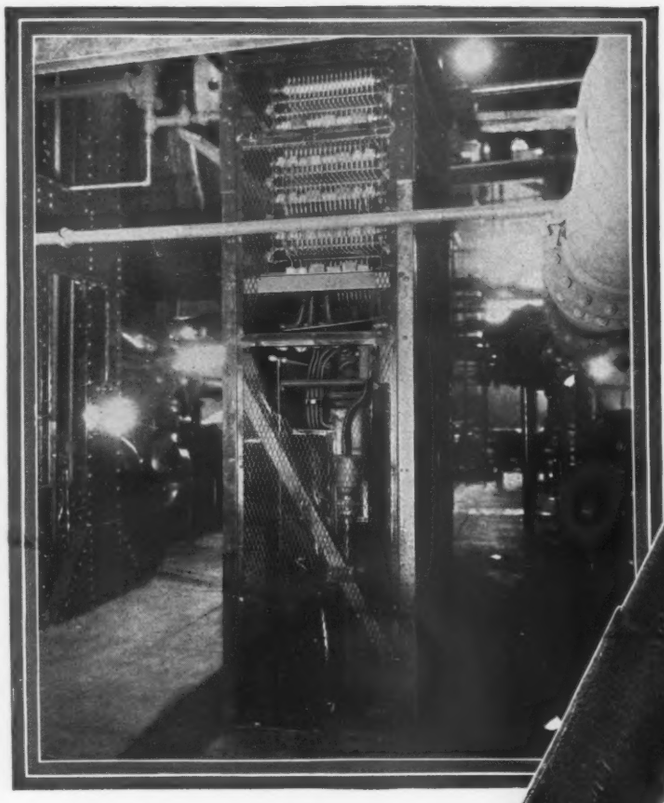
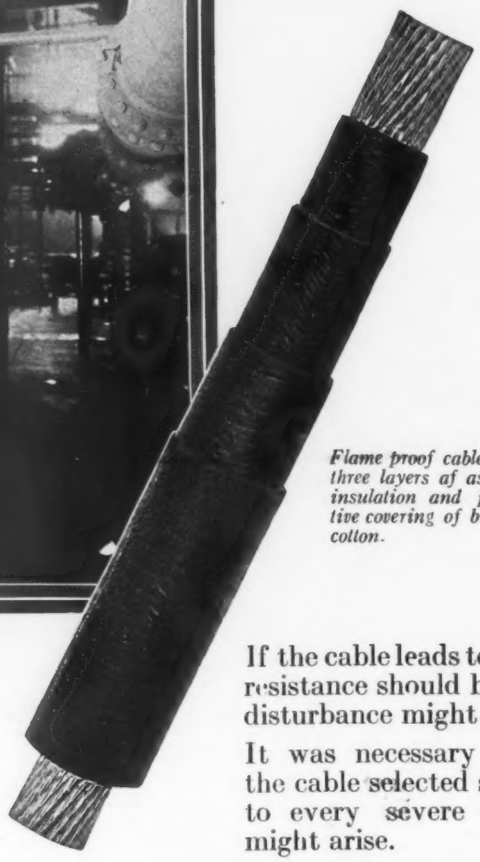


Hudson Ave. Station of the Brooklyn Edison Co. Rockbestos Flame Proof Cable used on this Secondary Resistance.

Rockbestos Insulation is put to a severe test!



Flame proof cable with three layers af asbestos insulation and protective covering of braided cotton.

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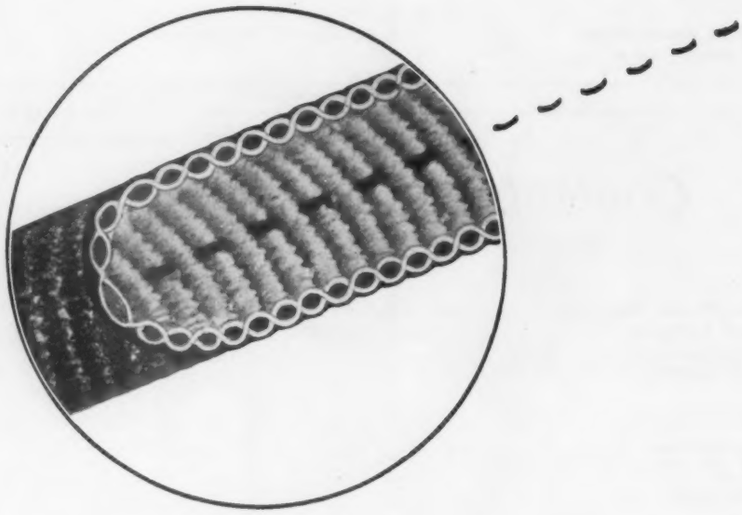
McGraw-Hill Purchases EMF Year Book

THE EMF Electrical Year Book has been purchased by the McGraw-Hill Company from the Electrical Trade Publishing Company. This important trade directory has grown rapidly during the four years of its existence until today it occupies a prominent place in the publications of the electrical industry.

Its purpose is to give accurate and concise information about the rapidly growing electrical industry. With the countless changes taking place in this new industry each year there has grown up an insistent need for a publication that would function as a complete and unbiased trade directory of all electrical products, their manufacturers, trade names and other essential trade information. The EMF Electrical Year Book adequately fills this need. It is a complete trade directory of the industry describing every manufactured product and listing every manufacturer thereof.

The EMF Electrical Year Book will be added to the McGraw-Hill electrical unit which now comprises Electrical World, Journal of Electricity, Electrical Merchandising, Industrial Engineer, Radio Retailing, Radio Trade Directory and the McGraw Central Station Directory. This latest addition to its publications marks another step by the McGraw-Hill Company to broaden its service to the electrical industry.

Why we put Roller Bearings in Duraduct



You know what a difference there is between hauling a load along a flat surface and rolling it over roller bearings. It's the same way fishing wire through loom. Ordinary loom has a flat surface in the tube. When you fish a wire through it the friction causes the waxed braid on the wire to slip back, bunch up and clog the tube. But DURADUCT is different! Its wireway is just one continuous chain of roller bearings. That is why DURADUCT is faster fishing. Wire just **hits the high spots** on the roller bearing wireway. There's no trouble fishing long lengths through DURADUCT. Fifty feet fishes as easily as five.

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EDITORIAL

"Busy Buttons" As a Humanizing Agent

TRANSLATIONS of the so-called mysteries of electric production and utility operation for the benefit of laymen have been numerous and their methods of approach of the subject have been varied. Yet none, surely, have been handled so charmingly as that of the Southern California Edison Company through its creation of that happy little representation of itself, "Busy Buttons."

Nearly all descriptions of utility methods of operation, financing, and policy have been attempted from a serious side. And though they often have been exceedingly well written and rendered understandable to the layman of even little learning and limited intelligence, they have been perhaps too formal in presentation to invite a thorough reading.

There never can be any accurate means of gaging beforehand just how many people will read and digest any given piece of literature. But certainly that piece of literature which engages one's interest, touching a human note of response, and promises to amuse as well as enlighten will enjoy a greater percentage of possible readers than one less appealing.

In the face of misunderstandings fostered by that type of political enthusiast who would capitalize on such misunderstandings, the electrical industry has been seeking some means whereby it might interpret itself to the public in terms that the public could understand, for, generally speaking, electrical development is a technical and complicated process. It has felt, too, that a humanizing of itself might contribute to more mutually satisfactory relationships between public and industry. Just what method should be employed to accomplish this humanizing, however, has been in question.

In "Busy Buttons" a courageous effort to establish that company upon a plane of complete visibility of its working processes is being made. Rate theory, financing, return on investment, and technical details concerning the physical properties and their expansion are stripped of their high-sounding qualities, taken from the artificially aloof shelf upon which the public places them, and brought down for scrutiny, to be seen simply as what they are and how necessary they are. The taxation situation is explained in words of one syllable, and a strong point is made of the fact that privately owned utilities, regulated by the California Railroad Commission, equalize their rates so that the farmer in the sparsely settled regions may enjoy the same service at the same cost as his more fortunate neighbor in the city where distribution is relatively less costly. The advantage of this economic situation, both to farmer and to city man, are also vividly impressed.

Altogether, because it probably will enjoy a much more widespread reading by the customers of the company issuing it, as much as because the matter in it is attractively handled, both as to illustration and text, the introduction of "Busy Buttons" into the industry will prove interesting to watch and see develop.

Industrial Lighting Activity Merits Fullest Attention of Industry

LIKE the Home Lighting Contest the work of the Industrial Lighting Committee of the N.E.L.A. has public service as its primary object, but with one exception. Where the activity of the Lighting Educational Committee was divorced entirely from commercialism, with its benefits more or less intangible, the industrial lighting activity has frankly a commercial purpose. In the earlier movement the entire industry was asked to take an unselfish attitude toward the educational work with the assumption that bread cast upon the waters ultimately would be returned with profit. In the case of the industrial lighting work no such restraint is suggested nor is any intended. The result will be a greater appreciation of the profitable aspects of better lighting in the factory, with an immediate and simultaneous profit for the electrical contractor, the central-station companies and the fixture manufacturers.

Its success reduces itself to the question: Do those on whom the movement depends desire to exchange some definite merchandising energy for a substantial and immediate profit?

The industrial lighting activity is a merchandising movement. It is based upon the fact that better lighting will insure greater factory efficiency, reduce accidents, prevent waste and improve the morale of workmen. If this idea is sold the inevitable result will be an order for an installation. The work must be done with profit, both to the electrical contractor and the fixture manufacturer. The central station will benefit from the increased sale of current. Locally, then, it translates itself into a simple and easily understood merchandising campaign.

On the Pacific Coast and in the Mountain states there are factories that are poorly lighted. The Industrial Lighting Committee has paved the way for the electrical industry locally by the publication of a series of national advertisements designed to

create an initial interest in better lighting. It has gone further. It has prepared booklets, pamphlets and sales material, together with an outline for local campaigns. The rest lies with the industry itself in the individual cities. Let the West put its shoulder to the wheel in this movement and take its fair share of the profits.

Santa Claus on the Job Again

WHEN our forefathers were boys Santa Claus had a poor load factor, for Christmas shopping started Dec. 24. Modern merchandising science is improving this situation, and in 1925 Santa Claus showed up in the majority of cities on Nov. 1 with his overalls on and punched the time clock in anticipation of the biggest volume of Christmas business in history. All of which is meant to serve as a timely warning to the electrical industry to start its Christmas merchandising season early.

Considerable space is devoted in this issue to a discussion of Christmas merchandising plans as developed by dealers and others last year. Of chief importance in the material presented, however, is a description of the plan adopted in Denver to make that place the "Christmas City of the World." Now word comes from Denver that the plan of giving prizes for outdoor home Christmas displays is to be extended to all communities in that section of the state. Judged on the basis of the success achieved last year, Christmas-tree lighting sets will be at a premium in that district again in 1926. Other cities in the country might do well to study the plan in effect in Denver and adopt it to their own needs. Certainly it is one way of bringing the electrical industry to the attention of the Christmas shopper.

Public Relations Appeal Commences Early

A WORTH-while work is being undertaken by the Committee on Co-operation with Educational Institutions of the Public Relations Section of the Northwest Electric Light and Power Association. This work consists in arranging for speakers from the ranks of the light and power companies to deliver talks on different phases of the utility business before students in electrical engineering and in business courses in the universities of the territory. It is understood that individuals in several companies have volunteered their services in this work, and as is indicated by the reported results of a recent meeting of the committee with professors and department heads of the Washington State College, Pullman, and the University of Idaho, Moscow, arrangements have been made with these institutions to try out a tentative program of speeches on a variety of subjects in a number of the classes during the balance of the current college year.

This, it seems, is an admirable adjunct to the public relations programs of the utility companies of the Northwest. To get a few facts about the business before a number of future customers and possible employees, while those young people are in a receptive mood for the absorption of such facts; to supplement the theory taught in the business courses by facts from actual experience, presented by men successful in their chosen callings, from the firing line, so to speak, of business—these aims constitute an excellent method of getting part of the electrical story before an important portion of the public that should be beneficial both to the cause of the utility companies in general and to the students as well.

Research and the University

RESEARCH is the foundation of scientific advancement. Efficiency and economy in research activities are attributes as valuable there as in fields of more commonly understood endeavor. Concentration of equipment, material, brains and funds tends to greater achievements and centralization of control. Such is the present-day tendency, and, while neither belittling nor decrying these efforts, a warning thought is timely.

Continuity of research depends primarily upon the continuity of supply of men of research ability. Opinions differ as to whether men must be born with this peculiar ability or whether it may be created by educational effort. Regardless of the differences of opinion in respect to the process of evolution of a research worker, whether it be the natural growth of inborn genius or the development of latent ability, education is the process which produces the desired result. This means simply that upon institutions of collegiate rank rests the responsibility of supplying the man-power without which a research organization becomes nothing.

To train properly men of research ability, or men of ordinary technical ability for that matter, our collegiate institutions must have research equipment; they must have funds with which to do research work; they must have an active hand in the solution of at least a portion of contemporary research problems; and they must have the full cooperation of the industrial organizations for which they are building men. Witihout this support the educational institution must labor under limitations which curtail its research activities and consequently curtail seriously its production of trained man-power which is the first requisite of successful research. Therefore, while perfecting the important centralized research organization, forget not the university.

A Coincidence or What Will You?

ON or about Nov. 21 next all roads in California lead not to Rome but to San Francisco. There may be those within the industry who will urge that the sole reason for this focussing of attention upon California's central metropolis is due to the fact that so many electrical organizations have selected perhaps not this exact date but dates thereabouts for holding their fall meetings.

The Executive Committee of the Pacific Coast Electrical Association, for instance, meets on Fri-

day, the 20th; the entire Commercial Section of this same useful organization will hold its fall meeting on the 19th and 20th; then there is the California Electrical Bureau which will meet on Monday, the 23d. Of course since there is a certain amount of duplication in the membership of these various organizations, non-conflicting dates are necessary in the interests of a good attendance and efficiency in operation.

It is strange perhaps that Saturday, Nov. 21, and the opportunities offered by this date have been overlooked as a possible time of meeting to discuss the many abstruse problems with which the industry is confronted. However, Saturday of course is an off day. It is difficult to get much done on Saturday morning because Saturday is a half-holiday; therefore, why bother with Saturday morning at all? Is it not better really for all concerned to take advantage of the long arm of coincidence and attend the annual Pacific Coast football classic at Stanford Bowl which offers a welcome relaxation from the arduous duties of protracted business sessions to all of those who are so fortunate as to have been able to obtain tickets?

Another Forward Step

METERMEN are valuable units of the electric service company's organization. It is upon these men that the company and the customers are dependent for the fair, accurate and infallible measurement of the power which one produces and the other uses. The duties of the members of the meter departments are peculiar and highly specialized. Metering and power measurement are strictly the work of those who have specialized in the work, and it is practically impossible to get properly trained men outside of the ranks of the utilities themselves.

Education of metermen is one of the most important subjects occupying the time and effort of the meter committee of the P.C.E.A. Definite courses are planned. Much hard work faces the subcommittee handling this particular subject. Some prejudice and much inertia must be overcome; executive support must be won by a barrage of indisputable facts and figures; co-operation of educational institutions of standing must be inspired; metermen and recruits alike must be shown that study and constant effort is the prepaid price of satisfaction, success and achievement. The results of consistent and regular "meter short courses" will be increased economy and efficiency in this important field.

Commercial Refrigeration as a Load-Building Field

INTEREST in electric refrigeration as a load-builder for the central stations is growing at a rapid rate. A recent study of commercial electric refrigeration on the part of one of the leading central stations in California brought out many interesting features that seem worthy of repetition. This investigator pointed out that commercial electric refrigerators should be used in preference to any other type of refrigeration because they gave better displays which resulted in additional profits and increased patronage, were economical as to operation costs by reason of the marked reduction in food loss, and were cleanly, convenient and healthful. What more could be said than this?

The field of application seems almost unlimited. Some of the major uses include ice-cream cabinets, soda fountains, water coolers, soft-drink coolers, dairy cabinets, meat markets, flower shops, grocery stores, candy shops, drug stores, cafeterias, and many others.

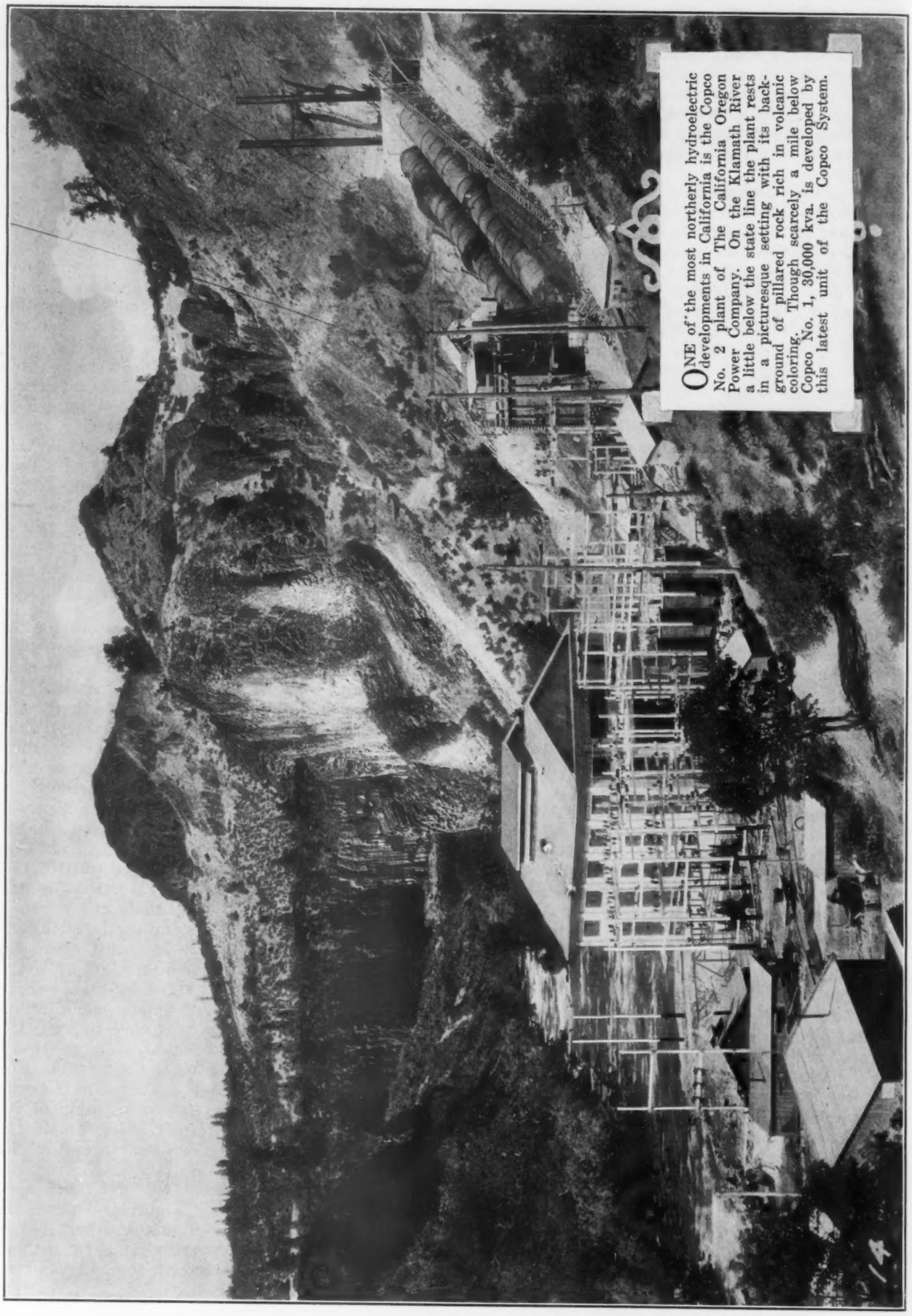
Here is an ideal set-up in which the power companies have the power plus a large sales organization engaged in pushing the application of load-building appliances. The commercial refrigeration companies have a product which has been tried and demonstrated to be sound, a well organized sales force and a financial backing to insure responsibility and service. The refrigerator offers a particularly valuable load-building appliance as it has a high load factor and requires no additional wiring, transformer capacity, meter readers, collectors or bill clerks. While no definite announcements have been made, it is believed that the sales programs of the Western central stations cannot do other than give careful consideration to electric commercial refrigeration in their load-building campaigns.

Advertising and the Utility Business

NOT the least important of the reasons for the low cost of electricity today is the power of advertising, according to a writer in a recent copy of "Printers' Ink." He ascribes the fact that the public is paying 10 per cent less for electricity and 73 per cent more for food, clothing and shelter than in 1913 to the direct and indirect effect of utility advertising. According to the writer, advertising has worked in three ways to absorb constantly increasing production cost and at the same time sell service for less money. In the first place, it has increased the volume of consumption to a point that made possible mass production and distribution with its attendant benefits. Then it has cut in half the cost of financing the extensions and improvements necessary to meet the constantly increasing demands for service. Finally increased prices for labor, coal and materials have been offset by economies in production brought about by mass selling.

There are still to be found among public utility executives men who believe that advertising is unnecessary because their business is a monopoly. For their benefit, we add to the arguments presented by the above writer a statement recently made by W. H. Hodge, advertising manager of the Byllesby companies and former chairman of the public utilities advertising department of the National Advertising Association:

"It is now generally recognized that there is no more possibility of making a success out of the utility business in this age minus expert advertising than there is in trying to get along without good engineers, capable accountants and auditors, salesmen and trained workers."



ONE of the most northerly hydroelectric developments in California is the Copco No. 2 plant of The California Oregon Power Company. On the Klamath River a little below the state line the plant rests in a picturesque setting with its background of pillared rock rich in volcanic coloring. Though scarcely a mile below Copco No. 1, 30,000 kva. is developed by this latest unit of the Copco System.

Klamath River Plant Completed by The California Oregon Power Company

ONE of the latest hydroelectric generating plants in the Western states is Copco No. 2 on the system of The California Oregon Power Company. This 30,000-kva. development has many novel features, one of which is the largest wood pipe line in the country. This article describes the project in detail.

COPCO No. 2 is the third of a series of hydroelectric plants recently constructed by The California Oregon Power Company, and the second unit of a series of developments made and to be made on the Klamath River in northern California and southern Oregon. The territory served by that company comprises a 300-mile stretch from the Sacramento River canyon in northern California to the Willamette Valley in central Oregon. This country is a progressive and potentially rich agricultural, mining and dairying district. Natural growth of demand, pioneer work on the part of the company in extending electric service to the rural communities, and foresight in preparing to meet future power demands is prompting a logical development of the hydroelectric possibilities as they become economically feasible.

Heading in the Upper and Lower Klamath Lakes, the hydraulic characteristics of the Klamath River are such that appreciable storage for any of the individual plants is not necessary. Hence the Copco plants are primarily stream-flow plants. Copco No. 1 has a forebay storage of some 10,000 acre-ft. for purposes of regulation and in this capacity also serves Copco No. 2, about a mile downstream, making of the two almost a hydraulic unit. A third and smaller and older plant in the Copco group is the Fall Creek plant. Copco No. 1 has a capacity of 25,000 kva. under a head of 125 ft.; Fall Creek, 2,750 kva. under a head of 730 ft., and Copco No. 2, 30,000 kva. under a normal operating head of 140 ft. These three plants are electrically interconnected by 66-kv. lines. Copco No. 2 was dedicated just a year and two days after work started on the project.

Dam

Several possible dam sites below Copco No. 1 were prospected before the final and actual location was selected. One apparently promising site would have utilized a structure some 125 ft. high and 500 ft. or so across the crest. This would have provided a forebay storage of several thousand acre-ft. and necessitated a tunnel of only some 800 ft. or so in length to the present power-house site. However, several factors entered into the abandonment of this and other possibilities for the present site. Construction costs per foot of developed head would have been increased appreciably. While rock was available for abutments and foundations on the surface, the rock structure was not continuous and was underlaid with volcanic material of questionable mechanical and hydraulic characteristics. Therefore, after careful consideration of the data collected by the various surveys, it was decided to build the smallest dam possible for purely diversion purposes and to build the necessary conduit to the plant site.

The dam is, therefore, a gravity-section structure of reinforced concrete. This net spill crest length is 130 ft. and height above the original stream bed 34 ft. The object of this dam is to divert a portion of the stream into the power tunnel. The location is about 1,000 ft. downstream from Copco No. 1. Water is backed up clear into the tailrace of the upper plant, thus no usable head is lost. The thickness of the dam at its base is 31 ft., and the flow surface of the spillway is a smooth parabolic curve.

Four heavily reinforced concrete piers divide the spill crest into five equal divisions. Each of these sections is 26 ft. wide, 22 ft. 6 in. deep and capable of passing between 5,000 and 6,000 sec.-ft. Each of these openings is controlled by a 11 x 26-ft. Tainter radial gate. Several different types of gates were considered and the final selection made on the basis of initial and operating economy. There are two gate-operating mechanisms, each kept normally connected to a gate, but either may be moved to an adjacent gate when the occasion requires. These mechanisms are equipped with a 5-hp. motor, and one of them is wired to remote control from Power House 1 and the other from Power House 2. In this way each power house has some degree of control over the water elevation. Furthermore, two gates are more than sufficient to pass the maximum flood that has been recorded to date. The two operating machines for the gates travel on a narrow-gage track carried on a bridge surmounting the aforementioned piers and provided for the purpose.

Test drillings on the dam site showed that the only solid rock in the immediate vicinity was a lava flow which came down at an angle from the hill at the northern end of the dam and continued at a slope under the dam itself. However, the depth of these strata is such that it was impracticable to carry the body of the dam down to them except at the northern end where the rock was closest to the surface. Elsewhere the dam structure is car-

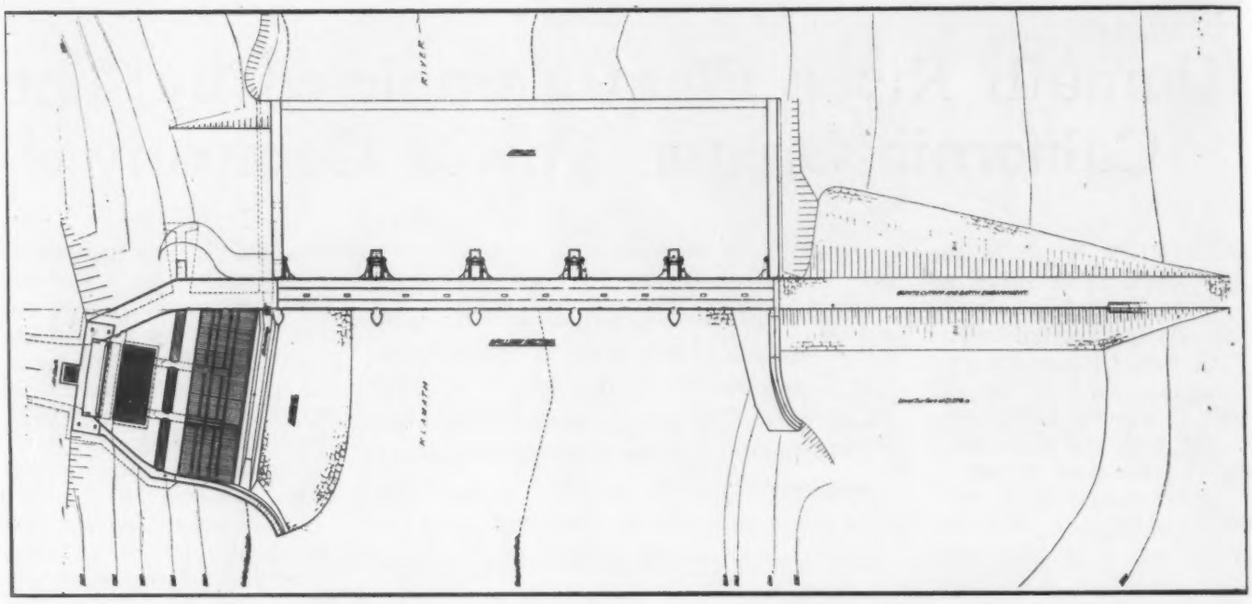


Fig. 1—Plan view of diversion dam and intake structure.

ried on a boulder-and-gravel combination intermixed with some cinders and some clay.

To make this mixture impervious to the passage of water a grouting ledge was provided at the heel of the dam, and the entire distance between the top of the rock strata and the bottom of the dam and intake structure was grouted solid. Further, this

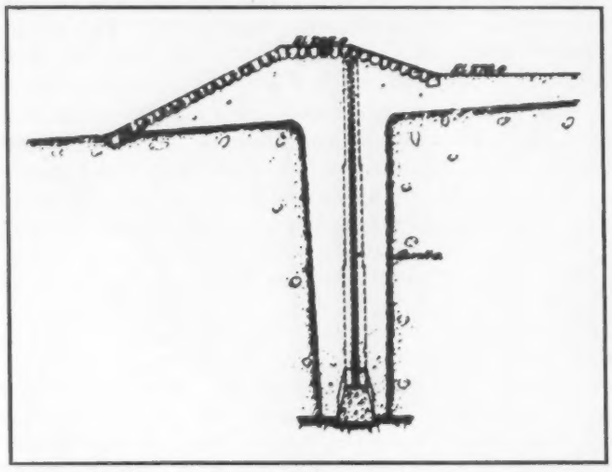


Fig. 2—Sectional view of Gunite cut-off wall and earth fill.

grouted mass was interlocked with the rock strata by drilling these rows of grout holes into the rock itself. At the northern end of the dam the volcanic rock layer was topped with a strata of cinders among other things that extended back into the hill and in which the water flow was excessive. At this end of the dam an earth-fill, riprapped-faced continuation of the main dam was constructed. As additional insurance a double welded-wire-mesh, Gunite-filled core wall was constructed at the center of the fill. As further precaution against excessive leakage this cut-off wall was extended into the hill, cutting off the cinder strata, for a horizontal distance of about 100 ft. Like the grouted section under the dam, this cut-off wall was seated on the rock strata and carried up to an elevation corresponding to the top of the bridge deck over the dam. Fig. 2 shows a typical cross-section of this construction.

The method of placing this Gunite cut-off wall was simple. Two standard-width strips of 3 x 3-in. Clinton welded-metal mesh were set up 2 in. apart and supported by a board wall which constituted a one-sided form. Concrete aggregate then was shot into the mesh by the Gunite process and the wall allowed to set for 12 hr. After this period of time the wall was back-filled on both sides to an elevation which permitted another section to be erected above the first.

As shown in Fig. 3, a 29-ft. apron is provided below the ogee section. Further it may be seen that there is erected at the end of the apron a 3-ft. baffle wall which is really a continuation of the lower cut-off wall. The object of this wall is to absorb the energy of water which may be spilling over the dam. Many experiments on a model were carried on with various types and locations of

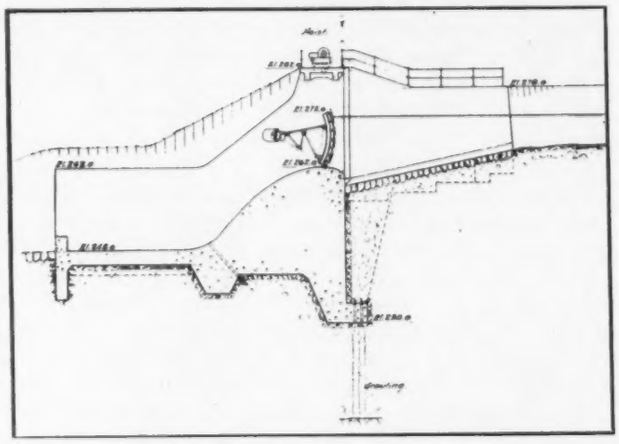


Fig. 3—Cross-section of diversion dam foundation, grouted cut-off wall, baffle wall, north curtain wall, gates and operating mechanisms.

walls, piers and depressions before the design finally was decided upon. Results of tests showed that for the particular job in hand the plain baffle wall at the end of the apron was the most economical.

Intake Structure

At the southern end of the dam and practically a part of it is the intake structure. It is of reinforced concrete and monolithically joined to the tunnel of which it is the portal. A trash rack 48 ft. wide and 32 ft. high serves to bar what little debris may collect in the forebay from entering the tunnel. No provision is made for rack cleaners because of the relatively short distance of open flow from the upper power house where all river debris is removed above the main dam.

Back of the trash rack the section tapers to a 19 x 20-ft. rectangle. At this point a single Philips & Davis caterpillar gate, 19 x 20 ft. in size, is installed. The operation of this gate is such as to obtain maximum water seal with minimum friction to be overcome by the operating mechanism. Of course, the plane of the gate face and that of the seat are parallel. However, the plane of gate motion is vertical while that of gate face and seat is at a slight angle, tilted toward the tunnel at the top. The gate itself is fitted with a caterpillar tread which carries all of the water pressure except for the last fraction of gate travel as it is seating. For this distance the gate slides on the seat. This gate is provided for purely emergency occasions when it may be desirable to drain the tunnel. It is arranged for remote operation from Copco No. 2 for closing only. No gates or valves are installed at the head of the penstock lines.

The operating machinery for the gate is carried on a structural-steel framework over the intake structure. On top of the tunnel and extending back a distance of 58 ft. from the intake to the hill is a Gunite cut-off wall. Just inside of the gate a vent is provided in the roof of the tunnel and carried to a point above high-water level.

Tunnels

Between the penstock pipes and the intake structure are two lengths of tunnel and one of wood-stave pipe. The upper tunnel is 2,440 ft. long and has a grade of 7.83 ft. per 1,000. The geologic structure through which this tunnel was driven necessitated timbering for construction purposes and full reinforcing of the concrete lining for about 70 per cent of its length. A typical tunnel cross-section is shown in Fig. 4, which shows lining methods for both timbered and solid-rock sections. An equivalent diameter of 16 ft. prevails throughout the entire tunnel with the exception of the 105 ft. between the surge chamber and the manifold.

The lower tunnel was driven through solid rock for all but about 180 ft. of the total 1,105-ft. length. This lower tunnel has a grade of 4½ ft. per 1,000. Total tunnel excavation was about 54,000 cu. yd. The reinforced concrete lining accounted for the use of some 12,700 cu. yd. of concrete and 422 tons of reinforcing steel. All but 80 tons of the latter was used in the upper tunnel.

Wood-Stave Pipe

Connecting the two tunnels is 1,318 ft. of 16-ft. inside diameter wood-stave pipe erected by the Continental Pipe Manufacturing Company of Seattle. This is the largest pipe of its kind in the United States. The pipe staves are 4 in. thick and of treated Douglas fir. The pipe-line right-of-way encountered nothing more substantial than the usual volcanic mixture, and hence particular attention had to be paid to the footings because of the tremendous loading. Reinforced-concrete footings were designed to transmit a soil pressure of a maximum of 2,500 lb. per sq. ft. On tangent sections these footings were placed on 10-ft. centers and on curved sections were placed on 8-ft. centers. The increased footings on the curved sections were to provide for horizontal thrust. Fabricated-steel cradles are mounted one on each pier to carry the pipe.

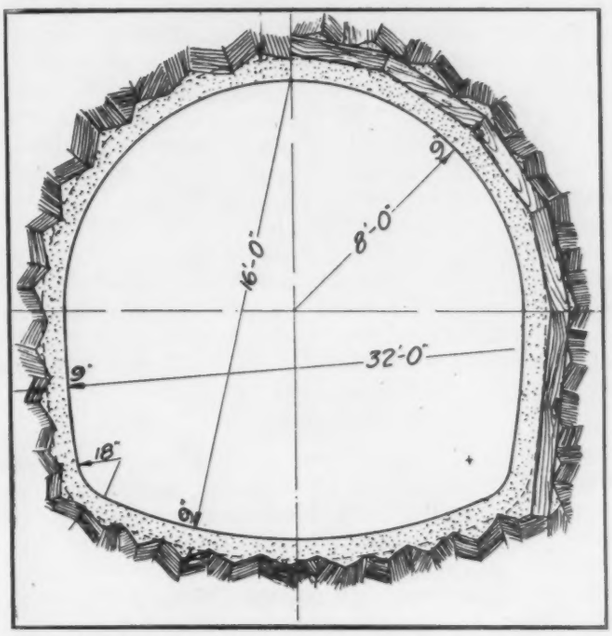


Fig. 4—Typical tunnel section; also shows method of timbering where necessary to timber. Total net area, 216.4 sq. ft.

What excavation was necessary for the pipe line was done with the idea of carrying all footings on original earth. When it is considered that the loading imposed upon the piers by the pipe when filled with water is about twice that for which the ordinary railroad bridge is designed, it is no wonder that 1,000 cu. yd. of concrete and 50 tons of reinforcing steel went into footings alone. The full-pipe loading is about 13,000 lb. per lineal ft. or 130,000 lb. per footing on the tangent sections.

At each end of the wooden pipe, connection is made to the tunnel through a 15½-ft. section of 9/16-in. steel pipe of the same inside diameter as that of the wooden pipe. At these points the tunnel shape is changed to a circular section to receive the steel-pipe thimble. The thimble is inserted into the tunnel for over half its length and into the wooden pipe for a distance of 3 ft. At each thimble is provided a steel vent pipe which extends high enough to top sufficiently the normal pond level at

the intake. These vents are designed and placed to prevent any collapsing force being imposed upon the wood pipe. The grade of the pipe line is 1.9 ft. per 1,000 and the normal head for which it is designed is 60 ft.

Surge Chamber

Directly over the tunnel and 105 ft. from the penstock portal is a spill-type surge chamber. The bottom of the chamber is 40 ft. in diameter. This section continues vertically for 10½ ft. and then tapers to a throat diameter of 20 ft. The total height is 52 ft., the length of the spill crest 33 ft., and the depth of the spill crest about 16 ft. An open vent shaft about 6 ft. in diameter extends from the top of the cavity through the hill above to atmosphere. From the spill crest the waste water is conveyed some 330 ft. through a 15-ft. horseshoe tunnel to a point where it is spilled down the rocky mountain side. Inasmuch as all of the surge chamber was excavated out of solid rock it was necessary to coat the walls only with a comparatively thin layer of Gunite reinforced with welded-wire fabric. All of the rock from this excavation was used for concrete aggregate, hence it was just as economical and more satisfactory to build the chamber totally within the mountain as to excavate on the outside slope for it.

In the design of this feature of the project there were two major requirements to be satisfied. It was necessary to provide sufficient surge capacity to enable the water flow in the penstocks to be accelerated from 0 to 3,000 sec.-ft. in 2 min. and to decelerate in about 4 sec.

Penstocks

At the surge chamber the tunnel section is changed from horseshoe to circular section and is 19 ft. in diameter. This circular section is distorted gradually until it breaks into two separate circular sections. At this point the two 13½-ft. penstock pipes enter and are sealed into the heavily reinforced, concrete manifold. These penstocks were supplied by the Western Pipe & Steel Company of San Francisco.

Each pipe is about 400 ft. long and is fabricated from 9/16-in. and 5/8-in. plates, lap-jointed, double-riveted, on longitudinal joints and single-riveted on transverse joints. Just before each pipe enters its turbine scroll case it tapers to 11½ ft. and is fitted with a Joshua Hendy butterfly valve of that diameter. Two main anchor blocks and one "flexible" anchor block serve to support each of the lines. The "flexible" anchor pier is located between the two upper main anchors at a depression bend and is provided to obviate the necessity of an expansion joint at that point. It is arranged with an asphaltum packing which permits sufficient motion to relieve pipe strain.

Bellows-type expansion joints are provided between each of the remaining anchor points. This type of joint is extremely simple and considerably cheaper than the ordinary slip joint. Essentially, it consists of four parts: a sliding joint between the two penstock sections, a peripheral fin or ring plate attached to each penstock section, and a second and narrower ring plate between the two that are fastened to the pipes. These three are riveted together at the outer periphery and form a circular flange having a V-shaped cross section. The comparatively short pipe sections and the relatively small temperature variation encountered necessitates but little longitudinal tape-up under operating conditions. The most severe strain upon the joints was during the construction period and no faults developed.

Power House

The power-house building, indicated in Fig. 5, is a structural-steel, reinforced-concrete building resting on a reinforced-concrete substructure extending 43 ft. below the generator floor. Built into this substructure are the two hydraucones for the turbine units. The substructure is designed to transmit a maximum pressure of 5,000 lb. per sq. ft. to the volcanic conglomerate which underlies the structure.

The building is 52 ft. wide, 60 ft. high and 103 ft. long. The generator room is 37 ft. wide and runs the full length of the building. It is spanned by two 40-ton Niles cranes. The use of the two smaller cranes instead of a single 80-ton crane effected an appreciable economy in spite of the slightly higher cost of the two cranes and the

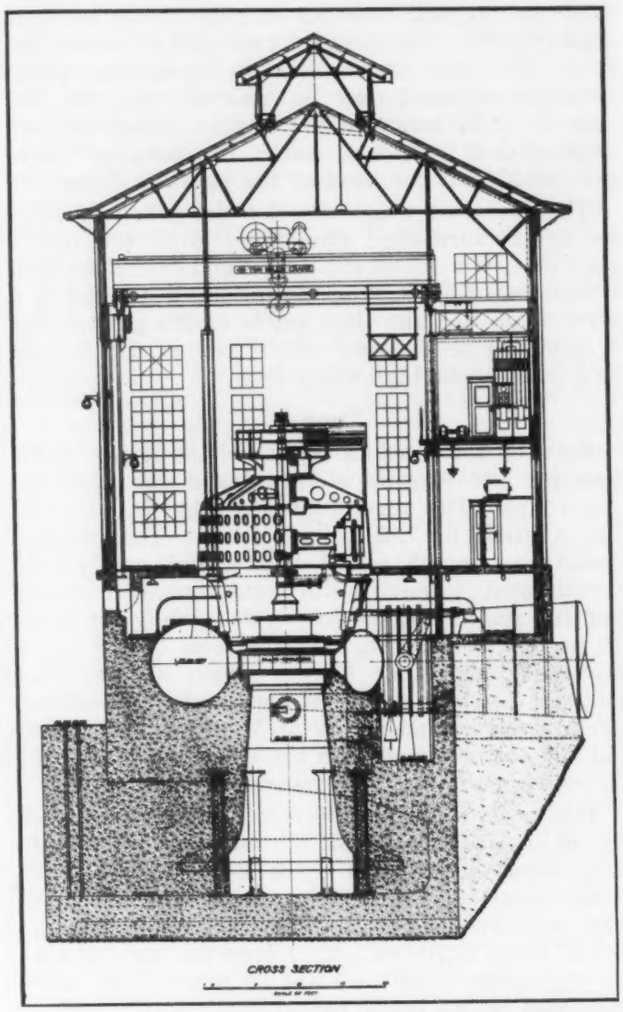


Fig. 5—Transverse cross-section of power house.

OUTGOING 66-kv. lines at Copco 2 are handled from an outdoor wood-pole structure (1). (2) One of the two 15,000-kva. Westinghouse generators; an Allis-Chalmers governor in the foreground. (3) Line 14 looking southward from Copco 2. This line ties the California Oregon system to that of the Pacific Gas and Electric Company at Delta, Calif. The line operates at 110 kv. (4) A glimpse of the 16-ft. wood-stave pipe. This is the largest pipe of its kind in the United States. Its full weight is some 13,000 lb. per linear foot. (5) Five 26-ft. radial gates effect a possible 11-ft. control of head in the forebay. Each gate opening can pass more than 5,000 sec.-ft. (6) Upstream view of diversion dam. Intake structure at left.

equalizer beam over the cost of a single crane. With the two cranes, construction work was speeded up, lighter rail girders were possible and consequently lighter column-and-wall construction followed; building height was reduced several feet; and last but not least, one 40-ton crane suffices for all normal operating conditions except those relatively few occasions upon which it is necessary to lift the entire rotor of a unit. When it is thus necessary to have the combined lifting power of the two cranes it is available through the use of the equalizer beam between them.

At the south end of the generator room the railroad track enters, and space equivalent to that occupied by one generating unit is provided for the convenient handling of equipment.

Extending the full length of the building on the penstock side (Fig. 6) is a 15-ft. gallery upon which is located the station storage battery, station service bus and equipment, main 6.6-kv. bus and generator rheostats. Beneath this gallery and centered between the two units is the main switchboard. Beyond the switchboard at the northern end is a locker room for the operators and at the southern end a storage room and a machine shop.

Generating Equipment

Two 15,000-kva., 0.9 power factor, vertical, 60-cycle, 3-phase, 6.6-kv., 171.5-r.p.m. Westinghouse generators driven by Allis-Chalmers, Francis-type turbines each rated at 20,000 hp. and designed to operate under a normal head of 140 ft. net, constitute the generating equipment. To each generator shaft is direct-connected a 95-kw., 250-volt, d.c. exciter. Each of these exciters is designed to serve only its respective generator. Consideration of the economies involved persuaded the plant designers not to install a spare exciting set and not to provide reserve capacity in either of the main exciters. Instead it was decided to keep on hand always an extra exciter armature. Thus to replace a defective exciter armature would entail a generator shut-down of only a comparatively short time.

Directly in front of the main switchboard are located the two Allis-Chalmers governors. These governors are the oil-pressure type and are belt-driven from the generator shaft. Governors are arranged for comparatively quick rejection of a load and relatively slow pick-up of load. This is accomplished by a special diaphragm installed in one of the oil lines which permits unimpeded oil flow in one direction, but which regulates the flow in the other direction to a predetermined value.

The location of these devices where they are readily under the eye of the operator assists materially in the concentration of control equipment. With essential apparatus where one man can oversee it without leaving his post near the switchboard it will be possible to operate the station with but

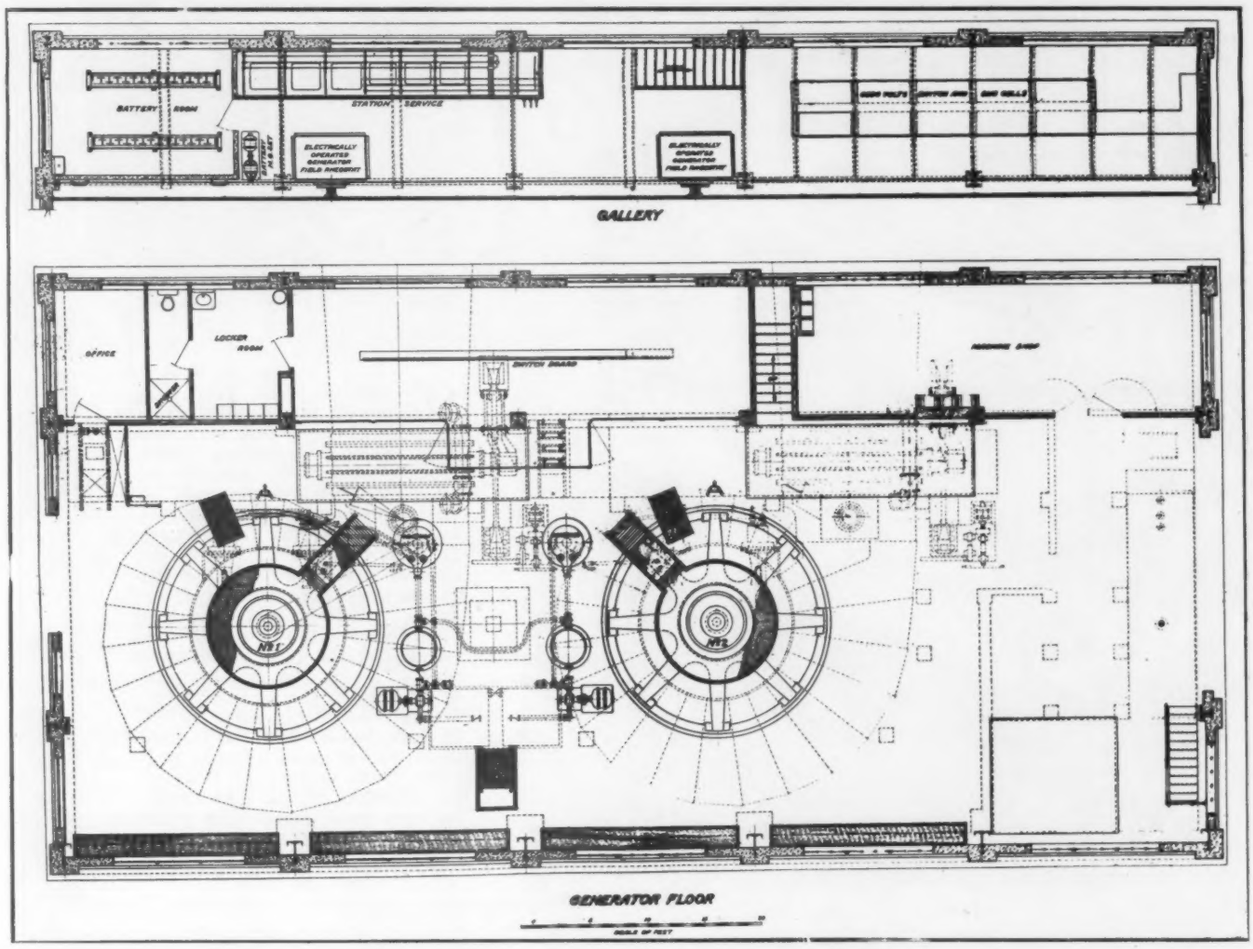


Fig. 6—Plan view of generating floor and gallery.

one man per shift and thus reduce operating expenses.

Further in line with the concentration of equipment is the location of the duplicate Allis-Chalmers oil-pump sets also between the generators but on the opposite side of the room from the switchboard. The size of these pumping sets is such that either is capable of supplying oil for both governors. Interconnection between pumping units permits full and flexible interchange of oil.

Design of the generating units themselves is somewhat special. One main Kingsbury thrust bearing mounted at the top of the unit carries the total rotor load of the entire unit. To conserve head-room in the building there is but one steady-bearing on the generator, the usual lower steady-bearing being omitted. This omission is compensated for by a steady-bearing located at the top of the turbine casing. Further to reduce head-room, to reduce massive concrete foundation construction, and primarily to lend the necessary rigidity to the

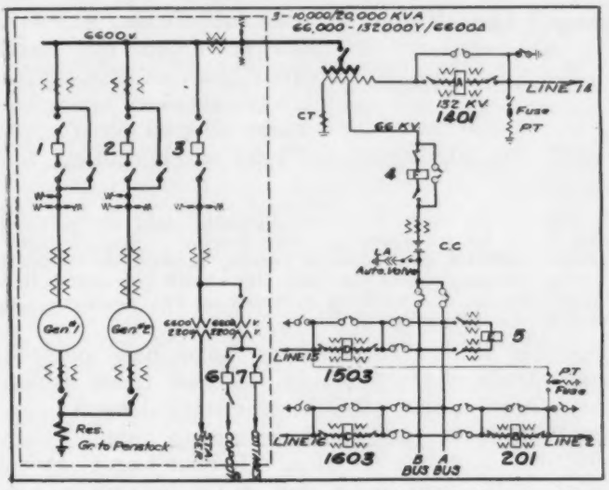


Fig. 7—Single-line wiring diagram of electrical connections.

turbine-generator unit, a cast-steel barrel rests upon the turbine frame and entirely supports the generator as shown in Fig. 5. A net saving of 10 ft. in building height was realized through this feature of design and construction.

Ventilation of the generating unit is accomplished by the draft created by the rotor. The steel supporting barrel in the basement has four openings for the passage of cooling air from the basement into the generator.

For fire-fighting each generator is piped for water flooding and the valves are located within reach of the floor at each generator.

Electrical Arrangements

A single 6.6-kv. generator bus was provided for the reason that with a single bank of transformers there would be no material benefit to be derived from a double bus at this point. Each generator is connected to the bus through suitable oil circuit breakers and disconnecing switches. For clearing an oil breaker there is a by-pass switch for each breaker. Providing for possible future needs, arrangements are such that another oil breaker may be installed to replace the air-break by-pass switch should it become necessary. As noted before, this bus is located on the gallery above the main switchboard. Continuing through the south wall of the building, the 6.6-kv. bus enters the transformer bus structure which is immediately adjacent. This arrangement effects a shortening of low-tension leads. From 3 to 5 copper bars, each ¼ x 3 in. and carried on Champion 15-kv. insulators, comprise this bus.

Because of some uncertainty concerning operating necessities of the more or less near future, the transformer bus and the 66-kv. main bus are of wood construction. The transformer bus accommodates a bank of three 20,000-kva. Westinghouse 6.6/66/130-kv. units and one spare unit. The high-tension leads pass to the top of the structure when they take off to an adjacent 110-kv. switch structure and on to the 110-kv. line. The 66-kv. taps on the transformers serve as a tie-in between the 66-kv. and the 110-kv. systems, which come together at this point.

Adjacent to the transformer bus structure is the 66-kv. bus. Here provision is made for double-bus switching of the three outgoing 66-kv. circuits. As indicated in Fig. 7, one oil breaker, two disconnecting switches, one grounding switch and two air-break bus-selector switches comprise the equipment for each circuit. A single bus-tie oil switch is provided but without a by-pass. To by-pass the bus-tie breaker it is necessary to close both of the bus-selectors on any one of the circuits. An automatic oil circuit breaker with suitable disconnecting and by-pass switches is installed in the leads from the 66-kv. taps on the transformers.

Lightning protection is provided in the form of a set of autovalve lightning arresters connected to the bus between the transformers and the outgoing circuits. Other protective features include differential protection on the generators and on the transformer bank. Operation of the generator differential relays opens the generator oil switch, kills the generator field, and operates the governor to shut down the unit. Operation of the transformer differential shuts down both generators and in addition opens the 110-kv. line switch and the 66-kv. bus switch. Over-speed and temperature protection also are provided for the generators and overload protection for the circuits.

Station service is assured through an automatic change-over which cuts in a line from the upper power house in the event of voltage failure at this lower power house.

The generator voltage regulators are Westinghouse extended-broad-range type and designed to give automatic voltage regulation from a field potential of from 4 volts upward to and above normal. For field voltages of less than 60, external resistances automatically are cut into the circuit, maintaining this minimum voltage of 60 on the vibrating regulators. This gives a full power-factor range to care for the peculiar service to which this station is subjected and does it without reversing the exciter. A complete cut-in or cut-out may be made in 11 sec.

"Busy Buttons"

The Soul of a Corporation Is Discovered as the Soul of Bright, Cheerful Service

IN a day when it is sometimes said by those who would have one believe it that any given corporation is "soulless," it is a refreshing and pleasant experience to find in one such accused company a soul—a soul devoted to cheerful public service. Most of us knew that it had one all along, for as surely as a corporation is made up of human beings, banded together, there's a real soul tucked somewhere in the structure if one takes the trouble to look it up.

A bright-eyed young emissary, "Busy Buttons," has just been employed by the Southern California Edison Company to carry its message to its 400,000 customers. This is an appreciation of that charming booklet, "The Story of Busy Buttons" and of the little trade character, "Busy Buttons," himself.

The soul of the Southern California Edison Company evidently is called "Busy Buttons," if one is to take as indication the attractive little pamphlet recently issued under his auspices.

And certainly, whatever else they may have been accused of lacking, public utilities have never lacked of dignity and of titles, the sound of which would leave no doubt as to the solidity of the institution. These have been valuable assets in their day. And yet, it has sometimes been felt that it is possible for a utility to lean backwards in its effort to maintain a straight, dignified posture, and that a graceful gesture now and then is not without its merits.

At any rate, a good deal is being said nowadays of humanizing industry. And it is likewise obvious that one of the chief obstacles to any "humanizing" process is the aloofness with which industry, for protecion, perhaps, always has clothed itself.

But in "Busy Buttons," the pendulum may be seen to swing back home, for here is a commonsense, human, simple characterization, and with a name which rolls easily off the tongue. "Busy Buttons" is the creation of a very human sort of person anyway, Richard E. Smith, Advertising Manager, Southern California Edison Company, one who is by no means given to making choice of names without deliberate thought and care. Ushering "Busy Buttons" into the world, Hallowe'en Oct. 31, therefore, occasioned a carefully planned coming-out party.

The last few days of October saw announced in the daily press and 120 or more country papers serving the territory covered by the lines of the Edison company, that "Busy Buttons, the busiest fellow in the country," was going to broadcast over Radio KHJ on Hallowe'en. Simultaneously that very morning, each of the 300,000 customers of the company received in the mail "The Story of Busy Buttons."

"Who is this Busy Buttons?" immediately became one of the general questions of the hour. The answer was given that night over the radio to all who listen in, and who does not? It also was written down on the inside front cover of this attractively prepared pamphlet where all who cared might read, and who would not read so charmingly told a story?

This is the story of "Busy Buttons," told as he would tell it, if he sat there at your fireside. "Busy Buttons" cannot actually go 'round in person, because he is not a really, truly person, but just the spirit of more than 80,000 people, his working partners of the Southern California Edison Company.

Other utility corporations have had and will have trade characters. In the past these usually have been named after some electrical term, some contraction or play on the company name. "Busy Buttons" is a pure creation. He hasn't an electrical watt, volt, ampere or ohm concealed about him anywhere. He isn't electrical in that sense.

"Busy Buttons" is a bright-eyed, cheerful, willing and winsome little bellboy, the like of which no hostelry ever possessed. He typifies the ultimate of service—quick, snappy, smiling service at the touch of a button. He isn't abstract like a kilovolt, for instance. He is perfectly obvious in that he is here to serve. His livery is that of efficient, recognized public service. His aspect is human and lovable. And the artist who drew his likeness put such a twinkle in his boyish eyes that no one could ever accuse him of not being "dead anxious" to please.

Best of all he gives his company a handle which the most ordinary human being may grasp without awe. A customer will listen to the story of "Busy Buttons" whereas he might be suspicious of or fear boredom by one from the Southern California Edison Company. "Busy Buttons," comprehensible and human, possibly may be worth getting acquainted with. The corporation, on the other hand, would merely be "spreading its propaganda."

The story of "Busy Buttons" gets off to a flying start in its first chapter and maintains its interest throughout. Because it is made up in a convenient

pocket size and runs its full length in 30 easily read pages, with illustrations in red and black that graphically convey the ideas to be expressed, it is

a booklet not apt to be set down, once it is started, to be finished at some other time—a time which seldom arrives.

In the first chapter, "How the Desert Became a Paradise and What Busy Buttons Had to Do with It," interest immediately is aroused.

A long time ago, when the first white men came to California, they found the same soil and sunshine and sky that we have today. But there wasn't a single city—not even a real estate office—because California lacked three vital things. These things were **Water, Transportation** and **Power.** People had to have water to drink, and the land needed water to grow things. People had to have transportation to bring them here. And after they got here they had to have power to run machinery, and pump water, and to keep things going generally.

The story goes on to tell how "Busy Buttons" found water in the high Sierra, harnessed it and brought it to the cities. From this, "Busy Buttons," tells of his more than two million masters, the people he serves, and of his 80,000 working partners, "who are the people who actually work to manufacture and deliver your power to you and the people who furnish the money with which the work is done."

Regulation by the State Railroad Commission then is explained simply in the third chapter, "Of the People, for the People, by the People." Establishment of rates, determination of kinds of service, sale of securities, use of capital, fair return on investment, and new construction expenditures, are tersely explained and justified.

People **don't have to** lend their money to "Busy Buttons." The only thing "Busy Buttons" can do to induce people to lend to him, instead of lending to someone else, is to pay them a good rental for their money, and run his business so economically that he can give everybody good service at low rates and still earn enough to pay these people regularly the interest that is due them and the returns whcih were promised them when they became partners.

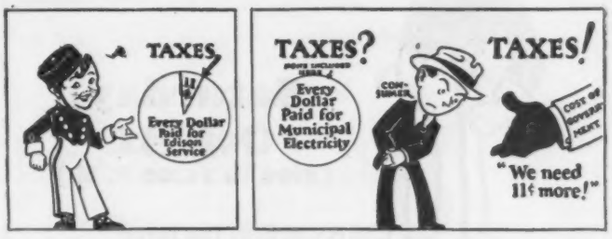
With California's population, the Edison investment is shown to have kept pace in growth. If California is to keep growing, "Busy Buttons" tells the reader, the same co-operation from the public will be needed. How the money received by the company is spent for wages, materials, and for the cost of money is described next.

That "Busy Buttons" also must take 11 cents out of every dollar he receives and pay it out as taxes, is then explained, and in the next chapter, "How Busy Buttons Makes His Dollars Go Farther," he tells the story of the Edison company's engineering achievements which have resulted in lower operating costs, saving the public money—"Busy Buttons" having been awarded for his meritorious service the Coffin Medal.

Opportunity is taken to point out that, with equal rates, stockholder ownership, by giving a greater reward for efficient operating, engineering and business ability, is able to give equal service with less invested capital than municipal or political ownership where the individual reward is at a minimum.

Good management makes the money go farther. When money has to take the place of management, more money must be used.

Why it is that with water costing nothing, the expense of generating and distributing power must determine the cost of electricity, is explained next. Then follows an explanation of the necessity for steam standby plants for emergencies. Methods of distributing electricity are different from those of



distributing merchandise, it is shown, and in a few words the long transmission lines and the networks of lines maintained by the system to supply "Busy Buttons'" service are dramatically set forth.

One of the best bits in the book is to be found in the treatment of the company's efforts to reach farmers so that cities may have their produce and all may benefit. From this point, the story flows naturally into the subject of rates being equalized over the entire system so that the farmer may enjoy the benefits of electricity as well as the manufacturer and city resident.

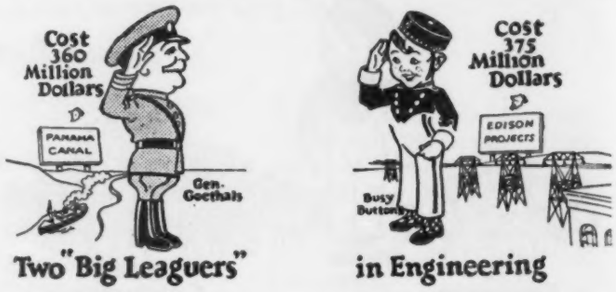
—— for it takes a struggle to get started on a new farm. If "Busy Buttons" can help the farmer to raise a crop, just that much sooner will the city man share in the proceeds. A ton of alfalfa will pay for a suit of clothes. Until the alfalfa is raised the suit cannot be sold—and there you are . . . It would be possible for "Busy Buttons" to charge less for his service in congested dis-

tricts, but then he would have to charge more in sparsely settled territory. That would destroy the balance. It costs the post office less to carry a letter to the next block than to carry one clear across the continent, but the charge is the same.

The future of "Busy Buttons" then is looked into. A telling comparison is made between the magnitude of the Edison projects and that of the Panama Canal project. Yet it is done in a way that is not boastful. Always it maintains the air of modest instructiveness.

That future requirements of the growing community served by "Busy Buttons" will require still greater investments leads naturaly into "The Partnership Busy Buttons Offers You." At this point an insert, offering detailed and more technical information regarding securities, is offered by "Busy Buttons," and the charming little book closes with a sincere expression of thanks:

And this is the story of "Busy Buttons," as related for his 80,000 Edison Partners, to the people whom they serve,



in order that all of us may understand one another better, and, "Busy Buttons" most sincerely hopes, be mutually more helpful one to another. I thank you.

All very well, but what continuation is to be provided for this interesting characterization? Immediate plans are quite definite on that subject, and future plans for the young fellow are to be worked out as he gets along in the world, according to Mr. Smith. The radio program, similar to "Busy Buttons' " introduction into the world, is being thought of as a means of keeping him before his public, perhaps in a monthly entertainment. "Busy Buttons' " working partners, the employees of the company, meanwhile will identify themselves as brothers of the fellowship by wearing a small "Busy Button." Vitachrome posters of "Busy Buttons" will be used to display electrical merchandise in Edison windows, and the young man is to be established in every way possible as the representation of the Edison company spirit of service in future advertising campaigns undertaken by the company.

To safeguard "Busy Buttons" from chance or deliberate kidnapping, the Edison company intends that each appearance of the youngster will be properly bodyguarded by Uncle Sam's copyrights.

And while the Edison company has not thrown its dignity overboard by any means, it has conceded that its representation as "Busy Buttons" will be effective and will be cheerfully received when carrying the Edison message to many of its customers. And too, while it will not become the "slogan" or supplant the title of the company itself, it is not inconceivable that there are members of the human family who will come to know the Edison company better through "Busy Buttons" and may even prefer to know it by that name, for it is a name which symbolizes that which they require of a public servant, and it is much easier to say in ordinary conversation.

The same 2¢ stamp delivers mail nearby and across the country
EDISON EQUALIZED RATES
The same "Spread Rate" delivers Electricity to distant and nearby consumers

Two Examples of Equalized Rates

BUSY BUTTONS
broadcasts over
STATION
K H J
Saturday
Oct. 31
[8:00 to 11:00 P. M.]
SERVICE in the home and song on the air! Turn the dial to K H J and listen to a program which represents the goodwill greeting of Busy Buttons—the Spirit of Edison Service and the representative of the 80,000 Edison Partners.
Have You Received Your Copy of "The Story of Busy Buttons" ?
We are sending one to each of our consumers. If yours does not arrive by Tuesday, tell the nearest Edison office.
SOUTHERN CALIFORNIA
EDISON COMPANY
Owned by those it Serves

Newspaper announcement of the radio program.

One of the many outdoor Christmas displays in the Denver residential section last year.

Denver, the Christmas City

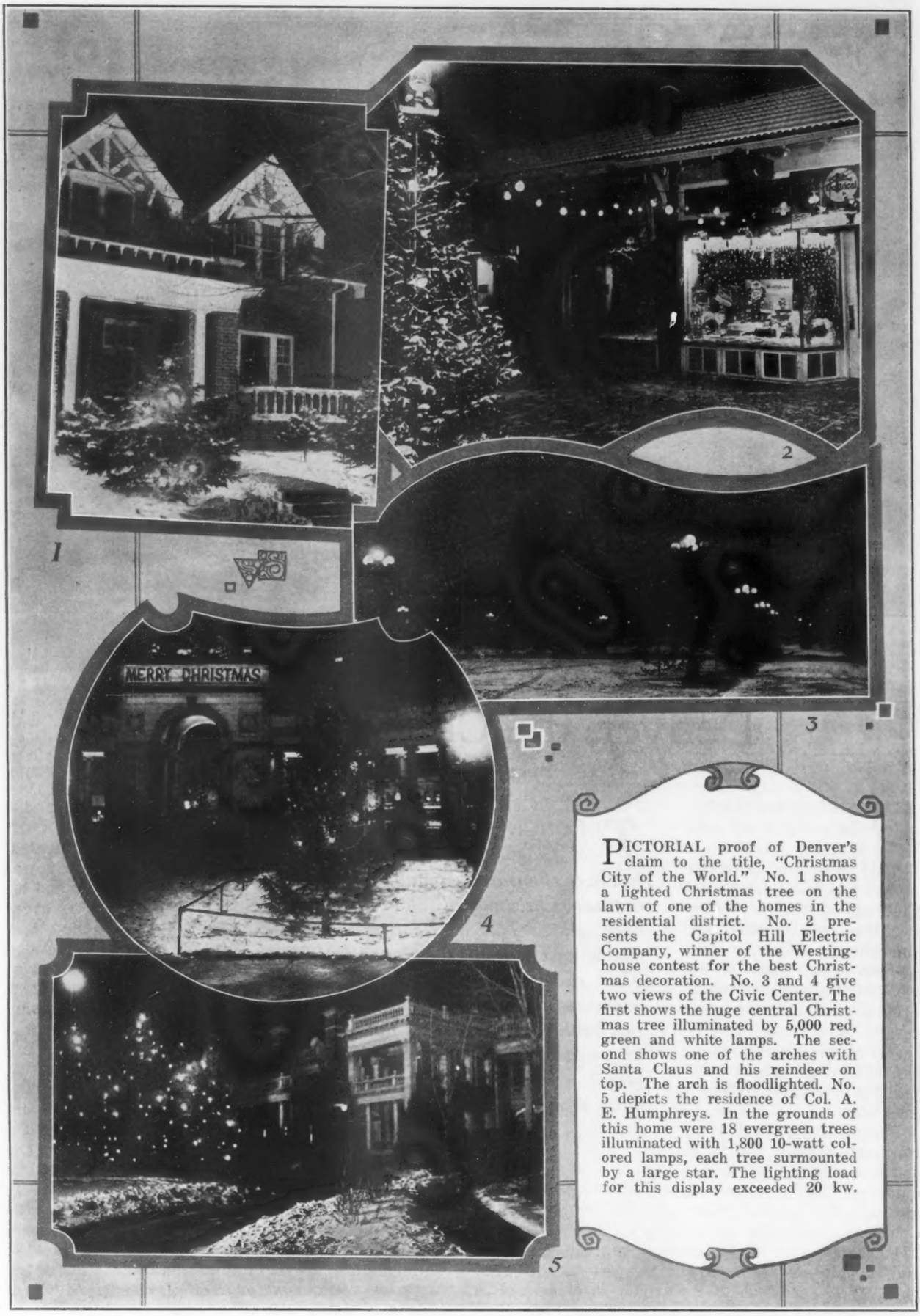
THROUGH the efforts of the Electrical League of Colorado a contest has been sponsored annually for the best outdoor Christmas display in Denver each year. This article describes the contest last year and the plans for 1925. That such contests are successful is evidenced by the fact that all Christmas-tree lighting sets were sold out last year and even lamps were at a premium. The idea is worthy of application in many other Western cities.

DENVER, the Christmas City of the World!

This was the objective of the Electrical League of Colorado of that city during the 1924 holiday season when it staged, in connection with one of the local papers, a contest which proved unquestionably successful in arousing the interest of the community to the advantages of exterior lighting during the Christmas season.

Featuring the contest in conjunction with the largest newspaper, the league obtained publicity many times more valuable than any which could have been provided by the organization in the display advertising columns, a total of 271 in. appearing in the paper during the campaign, and of this amount over 100 in. was on the front page. The result of this publicity is evidenced in the records of the league where during the 1923 holiday season about 400 outdoor installations were checked. During the last season this number was more than doubled, and assurance was given in every case that in 1925 the standard of individual installations would be improved and the number increased.

The league in planning the campaign followed the experience gained during three previous holiday seasons when such installations were suggested informally without any reward being offered in the form of prizes. In 1924, according to S. W. Bishop, executive manager of the league, it was believed that sufficient consciousness had been established to warrant a definite proposition being made to the community. This took the form of an actual illumination contest for which thirty-two prizes were offered, ranging from a silver percolator set to a two-way plug. These



PICTORIAL proof of Denver's claim to the title, "Christmas City of the World." No. 1 shows a lighted Christmas tree on the lawn of one of the homes in the residential district. No. 2 presents the Capitol Hill Electric Company, winner of the Westinghouse contest for the best Christmas decoration. No. 3 and 4 give two views of the Civic Center. The first shows the huge central Christmas tree illuminated by 5,000 red, green and white lamps. The second shows one of the arches with Santa Claus and his reindeer on top. The arch is floodlighted. No. 5 depicts the residence of Col. A. E. Humphreys. In the grounds of this home were 18 evergreen trees illuminated with 1,800 10-watt colored lamps, each tree surmounted by a large star. The lighting load for this display exceeded 20 kw.

prizes were purchased by the league, excepting a number of flashlights and plugs which were donated by their manufacturers. In addition, several vacuum cleaners were offered as special prizes by the Public Service Company of Colorado for awards to installations not covered by preliminary rules of the contest.

These rules were extremely simple and provided only that the lighting should consist of either growing or temporary Chirstmas trees on the outside of homes, properly lighted wreaths in windows, festoons of colored lamps or the use of "Christmas clusters," an idea recommended by the league in the form of two or three red and green lamps which were installed in a multiple-plug cluster as a substitute for the regular porch light.

In many cases all of these features were utilized and a number of novel ideas were developed in addition, such as the use of illuminated porch baskets, sun parlor illumination, the use of flashers and "skidoodle" plugs, and the general illumination of the grounds surrounding those homes having a large area. One installation alone, not included in the contest but perfected as the result of publicity given to the matter, was that of a prominent oil man and philanthropist who on the eighteen evergreen trees grouped before the porte cochere of his mansion used 1,800 10-watt lamps surmounted by a large white star. The lighting load on this one installation totaled 20 kw.

According to reports from Denver, many hotels and apartment houses featured exterior illumination and in every case carried the idea into the decoration of their foyers and lobbies to make them more homelike during the holiday season. Downtown business houses, especially the larger department and specialty stores, all featured exterior lighting effects of the same nature, and the league is planning a larger and more comprehensive contest for 1925 which will provide prizes for these various classes of buildings in addition to private residences.

Owing to the unusual Christmas decorations used at the Civic Center in Denver, the feature of which is the use of many thousands of colored lamps—a practice of a number of years standing—the development of the contest in Denver was correlated to the decoration and the turning on of these lights at the Civic Center, and to tie in the idea with next year's demonstration the league has recommended to the city authorities the planting of a permanent tree at the Civic Center that would serve each year as the center of the community Christmas tree activities.

In addition to the value of the development of the holiday community spirit in Denver, from a commercial angle such a campaign has definite commercial advantages, according to reports, not to mention the increased lighting load provided during the holidays. The sale of Christmas tree sets, special lighting stringers for use on 110-volt service, and the great demand for lamps from the Christmas tree variety to 40 and 50-watt colored lamps, was unusual; in fact, it established a new record in Denver. Less than 100 Christmas tree sets were to be found in Denver following the Dec. 25 rush, and before New Year's day all these sets had been sold, together with all colored miniature lamps on hand in the city, a complete clean-out of this material.

In watching the development of outdoor lighting during the holidays the Denver league has observed a definite tendency to increase the individual installations each year. In other words, persons having one illuminated wreath in their windows or single set of eight miniature lamps on an outside tree added to that installation the following year. The cumulative result establishes newer and higher standards each year, and in those residence communities where growing trees are found it is said that an intense neighborhood rivalry has developed in order to determine who could perfect the best outdoor illumination.

Instead of making the competition a free-for-all affair between houses of all types, various sections of the city will be marked off and special competition will be encouraged within those sections and also in individual neighborhoods. In addition, sweepstake prizes will be offered for the most attractively lighted homes throughout the city. Special competition also will be provided for apartments and hotel buildings and it is possible, according to A. C. Cornell, chairman of the league, that a special competitive event for churches will be included also.

One or more special prizes will be offered for the most attractive displays in each of the suburban towns around Denver within the territory served by the league at the present time. To the other towns in the Mountain region encouragement will be given toward the development of similar local contests. The league will urge central stations and contractor-dealers to back such activities in connection with local civic organizations and newspapers.

In addition, the Denver newspaper backing the league in the major contest will stress the desirability of such Christmas lighting displays for the benefit of residents of other towns of the region where the principal newspaper has wide circulation. This, it is believed by league officials, will give the outlying towns, where there is an absence of organized effort at the present time, a double opportunity to capitalize on such a holiday feature as a community undertaking, and especially those towns where municipal Christmas trees ordinarily are installed.

To insure more interest, both on the part of the public and the electrical industry, it is planned to launch the contest in Denver with an announcement not later than Thanksgiving time. This will permit of almost a month for development of the idea. Within the industry employees of electrical companies, in fact the entire personnel of the electrical industry, are to be encouraged to complete plans for individual displays to be started not later than Dec. 15. Previous experience has shown that individual lighting effects made several days before the holidays will be observed eagerly and in many cases duplications made by other residents before Christmas Eve.

CENTRAL STATION CONSTRUCTION OPERATION AND MAINTENANCE

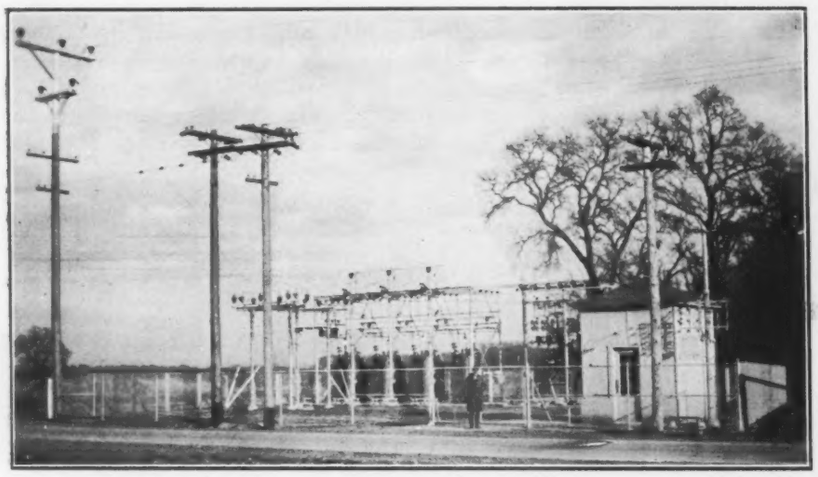


Fig. 1—General view of Pacific Gas and Electric Company's Rice substation.

Pipe Framework Economical for Small Substations

Outdoor Switch and Bus Structures of Small Distribution Stations Standardized Upon to Advantage

By B. D. DEXTER, Assistant Engineer, Pacific Gas and Electric Company, San Francisco

Pipe framework for switch and bus structures of small outdoor substations has been standardized upon and is used to good advantage by the Pacific Gas and Electric Company. The use of stock sizes of piping and standard fittings greatly facilitates the erection of these small stations, as well as reduces the investment required for their erection. Furthermore, such construction lends itself readily to this type of work, fills all structural and mechanical requirements, and presents a neat finished job.

A substation described in particular in this article is Rice substation (Fig. 1) located in Colusa County, Calif., 4 miles south of the town of Princeton. This substation serves as the distribution point for a moderate agricultural power load and is typical of small outdoor stations used by this company where the transformer bank capacity is not greater than 2,250 kva. This station receives power from a 60-kv. transmission line which is sectionalized with air break switches mounted in the line on each side of the station tap. (See Fig. 3.) The 60-kv. side of the transformer bank is controlled by a manually operated air switch and is protected by a 60-kv. fuse. Both switch and fuse are mounted on galvanized-tubular steel poles. The transformer bank consists of four 750-kva. Allis-Chalmers self-cooled transformers mounted on concrete foundations and placed 9 ft. apart, center to center. The transformer bus work, including the 60-kv. and the 11-kv. disconnecting switches, is supported on a galvanized iron-pipe structure. The transformer bus structure consists of four 9-ft. bays, one for each of the four transformer units. As may be noted from the accompanying illustration, the concrete foundation for the bus structure and for the transformers themselves really forms one continuous slab. The makeup bus for the transformer is carried along through the bus structure on lateral supports at an elevation of about 12 ft. above ground level. The main 11-kv. bus is carried on the top of the structure at a height of about 19 ft. above the ground.

As may be noted from Fig. 2 a system of change-over switches is provided whereby the spare transformer unit may be cut in to replace any other unit by the mere manipulation of two air switches on each side of the transformer bank. Thus it is unnecessary to move any of the units in order to place the spare unit in service. This is a big advantage in reducing outage due to this change. Mounted at one end of the transformer structure are the three 1.5-kva. station power and lighting transformers. These units are protected by fuses as is the usual custom. From the transformer bus structure the 11-kv. bus is carried across a short intervening space to a two-section unit-type switch structure, from which emanate two 11-kv. distribution lines.

This unit-type switch structure is also of pipe construction and is a simple structure. A single oil circuit breaker is installed for each 11-kv. circuit, with the necessary disconnecting switches on each side and an air-break switch for by-passing the oil circuit breaker when it is necessary to take the latter out of service for inspection or repairs purposes.

Each 11-kv. circuit nominally is controlled through a General Electric type KFO-37 oil circuit breaker arranged for automatic reclosing.

A small galvanized iron steel frame building is used for the purpose of housing the necessary lighting panel and provides space for the storage of incidental station supplies. Thus it will be apparent that a very small and comparatively inexpensive building is all that is necessary for this type of distribution station.

Although the main station power transformer bank is protected by high-tension fuses, it has been found that the reclosing oil circuit breakers on the 11-kv. outgoing circuits operate entirely satisfactorily under conditions

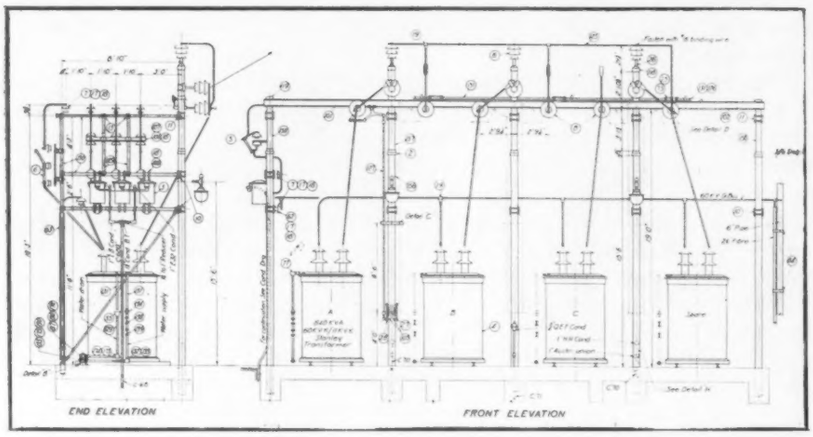


Fig. 2—Front and end elevation of pipe-frame transformer bus structure.

of trouble and without blowing the high-tension fuses. This has been accomplished by the careful selection of the high-tension fuse capacity and by the careful calibration and the proper setting of the induction overload relays on each of the 11-kv. outgoing circuits. The operation of this relay and fuse combination for station protection has been entirely satisfactory throughout the history of this station as well as that of others of this type. An elevation of the station layout is shown in Fig. 4 and a wiring diagram in Fig. 5.

Ten Commandments for Foremen

1. **Be fair.** Have no favorites and no scapegoats. A foreman has to act as judge many times a day; therefore be just.
2. **Make few promises and keep them.** A foreman must be exact in this particular. Sometimes a foreman forgets that his job requires a high standard of truth and honor.
3. **Do not waste anger.** Use it. Anger is valuable and should not be used carelessly. Keep your most forceful language for special occasions.
4. **Always hear the other side.** Never blame a worker until he has been given a chance to give his point of view.
5. **Do not hold spite.** Forgive. When you have to scold a workman, go to him later and show him his faults in a friendly way.
6. **Never show discouragement.** Never let yourself be beaten. A foreman must have perseverance and the "never-say-die" spirit.
7. **Notice good work as well as bad.** Let the worker see that you can appreciate as well as condemn.
8. **Watch for special ability.** Take a keen human interest in your workers. Put each one where he can do his best.
9. **Take your full share of blame.** This is the most difficult of all. The foreman who can share both blame and praise with his workers has discovered the secret of managing men.
10. **Prevent accidents.** Educate or eliminate the careless man. The good foreman is known by his men. He is a safety foreman.

—Contributed.

Threading Rope Through Tackle Block

Nearly everyone undoubtedly has had occasion to spend considerable time in trying to thread the ragged end of a rope through the tackle block or through some oddly shaped hole or through a hole in which the rope is an extremely close fit. Rope always expands when it is pushed.

A simple way to overcome this difficulty is to pass a piece of cloth through the hole. This is easily done if the cloth be slightly twisted. Then fold the corner of the cloth around the end of the rope so as to surround it completely, forming a sort of a cloth tube. When the cloth is drawn back through the block the rope's ragged end will be drawn together and pass through the hole without any trouble. Light cloth is all that is necessary unless the rope handled is very heavy or of a wire texture, in which case a piece of heavy canvas will serve.—R. A. Horton in P.P. & L. Bulletin.

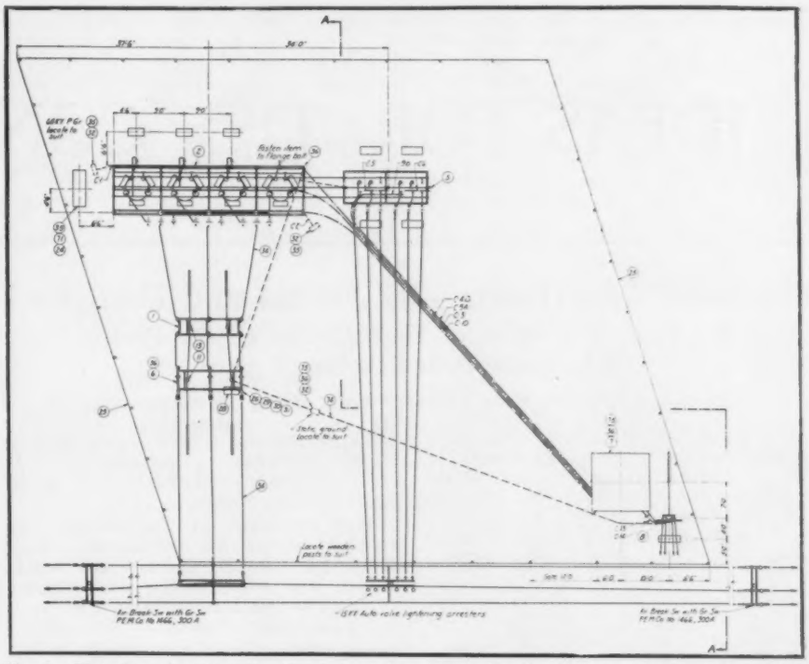


Fig. 3.—Plot plan of station showing among other things the 60-kv. line sectionalization switches.

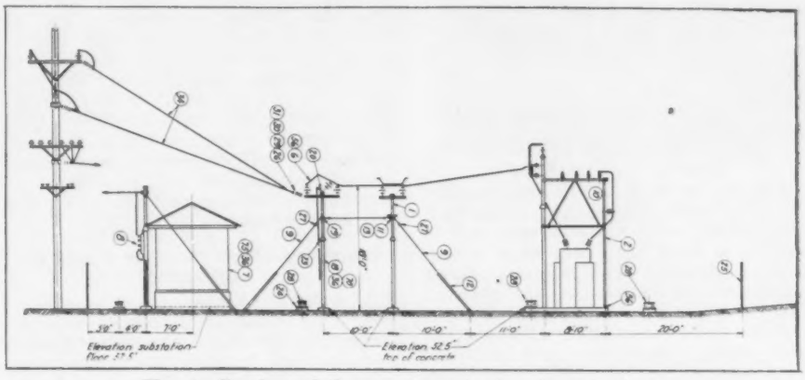


Fig. 4.—Showing relative arrangement of various structures.

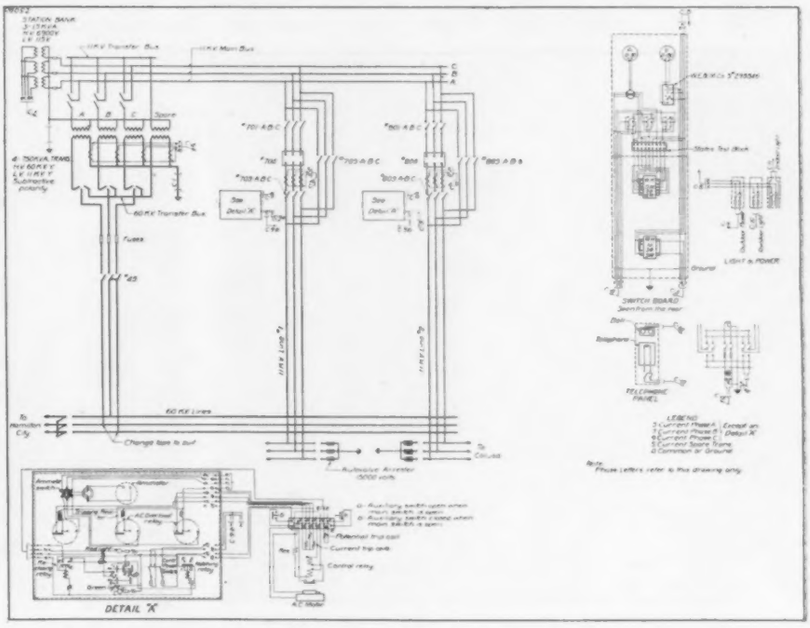


Fig. 5.—Wiring diagram of Rice Substation of Pacific Gas and Electric Company.

IDEAS FOR THE CONTRACTOR

Electrical Advertising—Its Forms and Design—I

The First of a Series of Four Articles on the Forms, Characteristics and Design of Signs

By C. A. ATHERTON, National Lamp Works of General Electric Company

Electrical advertising, as the term is used here, comprises all forms of display advertising which are illuminated by electric light to increase their effectiveness by day, or to make them visible and therefore useful after dark. Electrical advertising, because of its brightness, has an immense attracting power, and is probably the most effective form in which display advertising is used.

This series of four articles will be devoted to a discussion, first, of the principal forms of electrical advertising and their suitability to various uses; second, of the general characteristics that may be utilized in making electrical advertising effective; and, third, of the fundamentals of design that give a sign legibility, smoothness, and proper brightness.

Classes of Advertising

Advertising may be divided roughly into two general classes. The first reaches people in their homes and it remains at hand until they have leisure to see and read. This is often called circulating advertising. The second class, or display advertising, is fixed in position and relies for its effectiveness upon being conspicuous and unavoidable, reaching its clients by catching their attention as they pass.

Display advertising, because it cannot move and **because it must do its work on moving people,** must be very simple, striking — impressionistic. It must confine its efforts largely to an appeal to the senses.

The technique of the design and writing of advertising in its many forms has been studied at considerable length and many books and articles have appeared from time to time covering its many phases.

For effective display advertising differences in size and brightness must be emphasized; problems of design and arrangement of the parts of the display are of vital importance. This is particularly true in electrical advertising, where so frequently the figures and letters are formed, not in printer's ink on paper or cards, but in light. These and other characteristics suited to the growing outdoor life of the people are bringing about a more rapid growth in the use and popularity of electrical advertising than of any other publicity medium.

Forms of Display—Their Fields of Application

In general, displays may be divided into two classes; detached and attached advertising. The chief distinction is that for the former, space is bought or rented at important traffic centers, on roofs or in vacant lots without reference to the immediate surroundings and the display concentrates its effort upon the creation of a favorable impression in the minds of the passers-by for the product or service advertised, while for the latter, there is in addition to or entirely replacing this general impression-creating effect, another which has as its object that of labeling the particular locality. National advertising is generally of the detached, and most local displays, of the attached variety.

Detached displays are chiefly (besides street car cards) painted bulletins, poster panels, and large electric signs. Attached displays are chiefly exposed-lamp, enclosed-lamp, silhouette, and reflected-light signs, and building outline lighting, marquee lighting, and floodlighting. No two forms of display ever leave quite the same impressions. The effect of each of the available forms of display should therefore be very carefully considered before the ones to be used are selected.

Electric Signs

There are three general types of electric sign construction and these may be described as exposed-lamp, enclosed-lamp, and silhouette signs.

Exposed-lamp signs are best suited and most frequently used for electrical advertising which must be effective at the greater distances. Signs are seldom built for effective legibility of detail at distances greater than two miles or for visibility and identification at distances more than ten miles. These signs may be designed to give the strongest attracting power and the greatest individuality; they may be made the most brilliant; and they excel in their adaptability to the use of color and motion. For locations where the maximum reading distance is less than 250 ft. exposed-lamp signs are less effective and not often used.

Enclosed-lamp signs consist of luminous letters of glass either of small round lenses, painted sheets, or shaped

Fig. 1.—Display advertising may be attached or detached—a location marker or an impression builder.

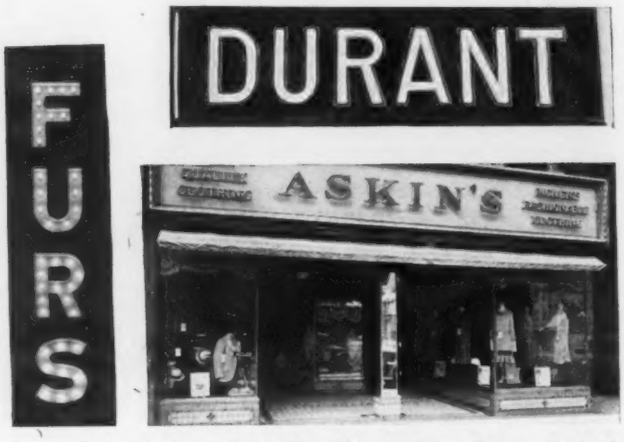


Fig. 2—Types of signs. Left: Exposed-lamp signs. Upper: Enclosed-lamp sign. Lower: Silhouette sign.

opal plates mounted in a metal case. They are best suited and most used for small location markers. Of these, the neatest and most suitable for all ordinary purposes, are the opal glass letters. Signs of this type are usually effective at viewing distances up to 500 ft. For signs the maximum reading distance of which is to be less than 250 ft., this type is the accepted standard. In particular, they excel for low hanging positions and for day and night advertising. They are not well adapted to the use of motion or picture and are seldom used with changing colors. In general, they are of the attached display variety and are chiefly used as plain-letter location markers.

Fig. 3—Painted signs also may be effectively illuminated in the manner of miniature bulletins.

Silhouette Signs

There are two general varieties of silhouette signs. In the first, the lamps are mounted in a trough over or, preferably, surrounding the letters and the lettering or pattern is suspended in front of the brightly lighted background. In the second, the lamps are mounted on the backs of the letters themselves but again their purpose is to light the background against which the lettering or pattern stands out dark in contrast.

Silhouette signs have of late been gaining in popularity, but in many districts they would still have the advantage of individuality. They are usually considered more conservative and less garish than exposed-lamp signs and some forms of enclosed-lamp displays. They may be made in any size but become less effective at great distances because of the difficulty of making the background sufficiently bright to carry through the smoke and haze of ordinary city atmosphere. The practical limit to their effective range is between 1,000 and 1,500 ft.

Illuminated Boards

There are three general types of illuminated board publicity, which differ principally in their advertising use and in the materials of which the pattern is made. They are called poster panels, painted bulletins, and painted signs. From the lighting point of view all three are alike. In the field of outdoor advertising, illuminated poster boards combine the greatest possible use of a beautiful picture and reiteration—two very great factors in impressing an advertising message—and for a given expenditure, the same story can be told through this medium to the greatest number of people. They are used to create a general impression which will become effective when next the article is needed or the location approached. They are therefore used principally for nationally advertised and nationally distributed merchandise. They are most effective in the popularization of the association of a particular brand with a particular quality, in the creation of a favorable impression on a large group of purchasers such as automobile owners, farmers, etc. They are practically always detached displays.

Painted signs are really bulletins which are used exclusively as location markers. In their advertising use, they are like enclosed-lamp or silhouette signs; in their illumination requirements they are like bulletins. They are the least expensive form of illuminated location marker.

Painted bulletins are similar to, though more restricted in their application than, poster panels. They are used most effectively for creating a general impression on a smaller group of people, such as the inhabitants of a city, for example, on motorists who are approaching and must pass a certain hotel or garage, etc. They share with poster boards the adaptability to the use of picture and to a lesser extent, reiteration. They are sometimes used to mark a location, and, to some degree, are used for national advertising in exactly the same way as are posters; just as poster advertising is also used to a limited extent in a restricted territory to create immediate sales. Generally they are detached displays.

Fig. 4—This building, because it is striking in itself, because its tower stands apart, because the business it represents is dignified, is a very good subject for floodlighting.

Building Displays

There are three general types of building displays which may be described as exposed-lamp, enclosed-lamp, and floodlighting displays.

Floodlighting for buildings is the most dignified and probably the most widely used form of building display. It is especially suitable when all of the following conditions obtain:

Rig. 5—Left: Outline lighting makes this ferry depot a vivid display by night—as impressionistic as by day. Right: By means of 13,000 lamps, the outlines of this imposing building are drawn on the sky.

Fig. 6—In a few displays, as in this one, are there adequate brightness, attracting motion, brilliant colors, beautiful individuality, a picture with a strong appeal, and very great size.

A. When the building is monumental, has natural beauty or striking architecture.

B. When the building has walls of relatively light color.

C. When the building stands apart —is not crowded in among other buildings—and especially when away from the brightly lighted portion of the city.

D. When the business or activity advertised demands dignified, conservative and quiet, rather than sensational publicity.

When all conditions are favorable, floodlighting is extremely effective and beautiful. When one of the first three conditions is lacking, the display may be very disappointing.

The use of enclosed-lamp building displays has been retarded in the past through failure to have the architect make provision in his first plans for recessing the lighting equipment, holding the cover glasses, and for easy maintenance. With the growing appreciation of the commercial advantage of some form of distinctive building display and the desire to control both the daytime and night appearance of the buildings they design, architects will in the future doubtless more often find it advantageous to incorporate enclosed-lamp displays.

Exposed-lamp building displays are usually called outline lighting. They vary from a single line under the cornice to an elaborate tracing of the outlines of an entire building. They may follow the architecture of the building or may superimpose an entirely different appearance on the building. The effect may be very beautiful and is, when a building of unusual or striking appearance is outlined and seen at some distance; or it may be very sensational as in the case of much of the outline lighting used in amusement parks. Although almost any general tone that is desired may be obtained with outline lighting, this form of display has more often been used by establishments catering to the bargain-hunting, transient trade, and is usually associated with wide-awakeness, quick turn-over, etc.

Characteristics of Electrical Advertising

Inasmuch as display advertising depends for its effectiveness entirely upon its ability to catch the attention and leave an impression from a glance, it is well before considering the design of such displays to review the characteristics that may be incorporated for accomplishing this end. The following are the most effective characteristics of electrical advertising:

The attracting power of brightness is instinctive—its appeal to the senses is of the most elementary sort. Bright objects are, moreover, more quickly comprehended.

Automatic motion is an exclusive characteristic of electrical advertising and its appeal is also dependent upon instinctive feelings.

The use of color is one of the most powerful means of creating an atmosphere—an inner feeling—a pleasant association, and these are among the chief functions of display advertising, particularly in its appeal to women.

One of the greatest weaknesses in much of the electrical advertising (small signs in particular) at the present time is the lack of individuality. Greater advantage may be derived therefore from an effort to give a sign individuality — differentness — than in most any other way.

Psychologists tell us that the subconscious mind rejects the untrue and unbeautiful. It is certain that most people want to forget a displeasing impression. An effort to make the display pleasing will be rewarded many times over.

Advertising experiments have proved that newspaper space filled with a picture is seven times more effective in selling goods than is the same space in reading matter. A picture is instantly understandable to all and conveys far more than could be stated in the few words that may be included in a sign.

Fig. 7—No display should fail if it helps to carry some tie-in with the other forms of advertising done by the firm.

In an age when new size records are made almost daily, the biggest sign in a district is not only more likely to be seen and remembered but is usually more likely to be talked about.

Best General Combination of Characteristics

Not all of the preceding characteristics are obtainable in the same degree in all forms of electrical advertising. The purchaser should select a display with a view to the particular advertising requirements and the power of the display to meet them. The advertising impression that is required must be decided upon. It is necessary to know the following:

A. The definite message that the advertiser wishes to tell, stated in as few words as possible.

B. The general impression to accompany this message. Does he wish his establishment to be thought of as conservative or as sensational? Does he want to appeal to the single-trade transients or does he wish to build his trade slowly on "repeaters"? It is as illogical to use a gaudy, winking sign on a dignified old banking house as it is to advertise a continuous bankruptcy sale with a sedate, retiring, and inconspicuous location-marker sign.

C. The style of other advertising that the firm is doing. Many advertising programs are far less effective than they should be because the "tie-in" has been omitted. When a large sum of money has already been spent in other forms of advertising in establishing a color combination, a monogram, a trade mark, a characteristic name, or a slogan, the subconscious impression created thereby should be capitalized by using the same or a nearly related pattern in the sign.

Merchandising by the Electrical Contractor-Dealer

Extracts from the Report of a Special Committee of California Electragists Presented at their Lebec Convention

Recommending a full co-operation with the central-station program of merchandising, and asking that steps be taken to elicit from central stations and jobbers a like co-operation, the report of a special committee of California Electragists, Southern Division, on "Merchandising from the Standpoint of the Contractor-Dealer," was presented to the second quarterly convention of that division at Lebec, Calif., Oct. 16. The report struck a new note in the problem of merchandising and set a standard by which policies for future efforts must stand, it was the opinion expressed by many who heard the report.

Starting with a survey of the problem which has presented itself due to the very evident intent of central-station companies to begin merchandising on a serious scale, the report speaks of the sentiment in favor of such a program evidenced at the N.E.L.A. convention in San Francisco. The report states, however, that the central stations are not unmindful of the importance of contractor-dealers. As evidence of the central-station program, and also of the recognition of the status of the contractor-dealer, the report, reproduced here in part goes on to state:

"In support of these statements we quote you briefly and at random from some of the papers referred to, as follows: From the July number of Electrical Merchandising relative to the recent N.E.L.A. convention:

" 'The report of the appliance committee . . . was unquestionably the high point of the three afternoons of commercial meetings. It drew the bumper commercial crowd of the week. . . . First Vice-chairman Phillips . . . hammered home to central station men the reasons why they should sell electrical household appliances, and sell them hard.'

"Edward S. Hurley, a manufacturer, in the same issue of Electrical Merchandising, writes:

" 'There is a very strong co-operative spirit on the part of many central stations towards their local dealers, in encouraging them to increase the sales of electrical home appliances of standard quality. This splendid spirit . . . has resulted in large sales . . . by both dealers and central stations, yielding substantial profits to both.'

"In the September issue of Electrical Merchandising, J. E. Davidson, newly elected president of the N.E.L.A., says in speaking of a recent tour of the East:

" 'I was surprised very much when I found out that only 49 per cent of the power and light companies are now doing an active merchandising business. Executives, especially those of managing companies, should increase their interest in commercial activities.

. . . They should encourage those in the commercial departments of their companies. . . . Commercial men of power and light companies should work in close co-operation with all agencies who sell electrical merchandise. This can be done by close association in local electrical organizations; by furnishing aid and advice in arranging window displays; by frequent conferences to discuss proper merchandise and merchandising methods, and by co-operative advertising. Working together in this way it is inevitable that more sales of electrical appliances will be made, and that the purchaser will receive a higher grade of service.'

"The Pacific Gas and Electric Company of northern California has just made public the details of a vast merchandising plan which takes the electrical retailer into consideration at every turn. Needless to say it has the whole-hearted support of our branch of the industry in its territory.

"Nearer home and more recently, we quote in part from an interview with S. M. Kennedy of the Southern California Edison Company as published in the Electrical World under date of Oct. 3, 1925. Mr. Kennedy was asked if the merchandising department of a public service company should be run on a profit making basis. His reply was:

" 'There are two reasons why the sale of appliances should be conducted on a merchandising basis. The first reason is that the power company should co-operate with the dealer and not engage in unprofitable ventures. The second is that there should be a margin of profit, sufficient to cover at least the actual selling expenses of the merchandise distributed b e c a u s e it might be said that part of the burden of selling the appliances to some consumers had to be borne by other consumers not interested in the sale of these devices. The Edison company is strong for working with and co-operating in every way with the dealer and contractor.

" 'The contractor-dealer has opportunities which are peculiar to his business and the power company should realize that assistance given the dealer will benefit all concerned.

" 'Further, the more such appliances and devices sold, the more work there will be for the contractor-dealer in the installation of wiring, fixtures a n d other materials to enable the appliances to be put in.'

"And now a final quotation from another branch of the industry. James H. McGraw, Jr., publisher, writing in one of his journals under date of August, 1925, brings out the one most essential truth in the whole merchandising problem. He says:

" 'For fifteen years everybody in the electrical appliance field has talked "sales," gross volume, and "how to get the business." Yet, gentlemen, today it is not gross volume of sales we want. It is profit on retail capital invested. . . . We have been worshipping at the shrine of "gross," when we should have been putting our for-get-me-nots at the feet of "net." . . . No matter what the urge or the seeming necessity, any future plan that sets aside dealer profits for gross volume, should be shunned like the plague.'

"We believe that these quotations, representing, as they do, the sentiment of leaders in other branches of our industry, firmly establish the premise on which your committee have based their efforts, namely:

"First: The central station is entering the field of merchandising as never before.

"Second: Their programs for most part contemplate a close tie-in with the retail dealer.

"Third: The whole industry recognizes the fact that if the contractor-dealer is to play the part expected of him, he must be assured a net profit on his transactions.

"The one and only reason for the renewed commercial activity on the part of the central stations is to build load. Their job primarily is to sell kilowatts; and more appliances sold mean more kilowatts sold.

"The thing now becomes a wheel within a wheel. More kilowatts sold mean more convenience outlets, more wiring and more business in general for the contractor-dealer, for the jobber, for the manufacturer, and, in short, for the whole industry. We decided, therefore, that there is no such thing as a merchandising problem considered solely from the standpoint of the contractor-dealer. The problem exists, but it is common to all branches of the industry.

"The central station wants, and must have, more appliances on its lines, more load. The manufacturer wants more and better outlets. The jobber wants bigger volume. The contractor-dealer insists that he is the logical point of contact with the buying public; and that to function properly he must make a net profit.

"Obviously, then, no single group can attack the problem alone and solve it to the best advantage to all, or even to the best advantage of its own particular branch of the industry. The thing must be worked out co-operatively by the several groups.

"Just what form a co-operative program of this kind should assume, your committee is not prepared to say; but we believe that when one branch of the industry evolves an idea or feels the necessity of an intensive selling campaign, that this fact should be communicated to the balance of the industry and their co-operation solicited.

"As an example, suppose a central station brings in a big block of power for which it must develop a market. Would it be better business for it to organize a special field force of salesmen and institute an intensive selling program all by itself, or to avail itself of a sales force already organized and in the field? We refer to the sales organizations of every jobber and contractor-dealer in the territory. Your committee hope that this thought contains the germ of an idea which the central stations may see fit to incubate.

"So far this report has dealt pretty much with generalities. We will be more specific. Some time during the month of August we came to you with a plan to make October a 'Toaster Month.' We recommended that, beginning with the first day of October and ending promptly with the close of business on the last day of the month, you offer for sale some one standard make of electric toaster at a price as much lower than the regular price as you, individually, could afford to sell it. We laid particular stress on the point that whatever toaster you selected should be a standard make with a nationally known price, in order that the public would recognize your offer as a genuine bargain.

"There is nothing new about this plan. It was copied from the department store idea of 'leaders' and 'specials' sold at a loss in order to bring people into the stores and stimulate the buying spirit. We recommended that you display the toaster prominently, that you talk it constantly, and that you advertise it as much as your appropriation would permit.

"It developed that this plan very closely coincided with a similar plan about to be launched by the Southern California Edison Company. So it was not difficult to arrange that the two campaigns should begin and end on the same days. Jobbers and manufacturers, as you know, are assisting with advertising helps and other publicity to make our initial attempt a success. So, for the first time, we believe, in the history of southern California we have the whole industry working together to put over an idea.

"We have asked you to put all the enthusiasm possible into this sale and to keep an accurate account of the toasters you sell, together with a summary of other appliances sold as a direct result of the publicity. This information is most valuable, and if you fail to provide it you will fall far short of your obligation to the industry.

"In fact, the spirit in which you enter into this first attempt at co-operation with our fellow members of the industry, and the promptness and completeness with which you report the results, will influence to a far greater extent the future activities of the merchandising division than will the volume of merchandise actually sold.

"We shall not be too greatly disappointed if the sales resulting from our combined efforts in this campaign fall short of the sales made by the Edison company; but we shall be chagrined indeed if we do not show a coordination of purpose that will inspire our leaders in the future and prove to associated groups that our co-operation is worth cultivating.

"Just at this point we want to interpose the gentle reminder that your committee did not work up this plan alone and spring it at you out of a clear sky a few days prior to Oct 1. On the other hand, we came to you individually during the latter part of August, laid the details before you, and asked, 'Do you like it, and will you support it?' Almost to a man, you said, 'I do and I will.' So this is not our idea alone; it is yours as well.

"We, as a committee, are not trying to shift the responsibility. But we are trying to bring home to you the fact that the success or the failure of such undertakings depends, not upon the recommendations of a committee, but upon the spirit and enthusiasm with which the rank and file of the membership get behind them.

"We recommend that a permanent merchandising committee of four men be created, headed by Mr. Robertson, to administer the affairs of the Merchandising Division, thus relieving our Executive Committee and our Executive Board of these added duties."

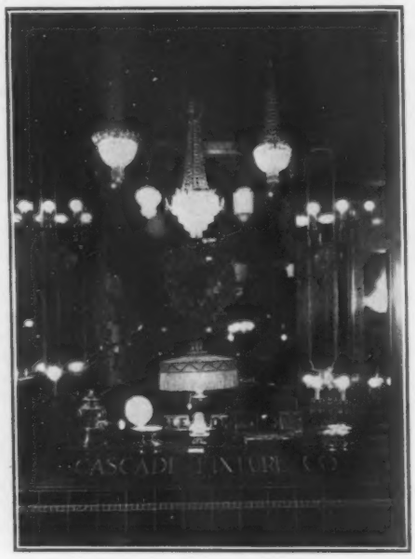
GIVE ELECTRICAL CHRISTMAS GIFTS

Better Merchandising

BUY ELECTRICAL GIFTS FROM ELECTRICAL STORES

Selling Electrical Christmas Gifts

CHRISTMAS comes but once a year, but that once, merchandisers of electrical appliances feel, is when Santa Claus is to be expected to fill their coffers with gold. It is not enough to sit back and wait for Christmas morning to bring that reward. A good merchandiser is one who meets Santa half way, and makes it possible through increased sales for his stocking to be filled. From last year's Christmas experiences, the following merchandising ideas, which proved so effective then, are offered to others this season. Windows and salesrooms, billboards and other advertising media offer opportunity for sales presentation of an unique order at this time. From many admirable ideas utilized in last year's holiday campaigns the following have been selected as typical styles or methods of presentation.

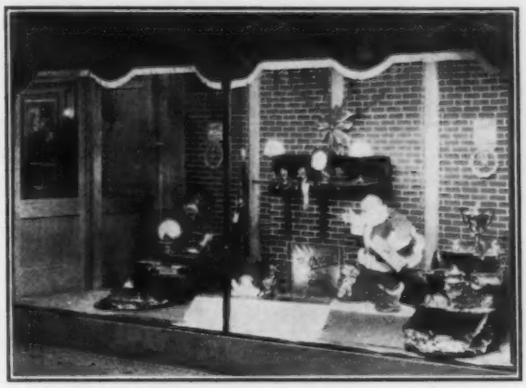


ELEGANCE and dignity, characteristic of high-grade jewelry displays, lent value to electrical merchandise in the windows of the Cascade Fixture Company of Seattle. A few choice articles, displayed against simple yet rich background, with good taste, were effective.

STRIKING the keynote of Christmas good will, the Public Service Company of Colorado made this message the center around which its merchandising displays were placed.

BILLBOARDS are effective in focusing public attention on the value of electrical Xmas gifts. Many forms of billboards may be used advantageously, the board on the right having been found a good sales help last year. Many 24-sheet posters are available to live dealers.

BEAUTIFUL backgrounds for windows are always attractive to the passing Christmas throngs. The window shown above made especially good use of a special background depicting old-time Christmas traditions, setting off the bright electrical merchandise in the foreground by its soft, subdued colors. Live evergreen trees, too, made this window of the J. C. Hobrecht Company of Sacramento an excellent one.



INSIDE the store it is important to maintain the holiday atmosphere, too. A tasteful display of merchandise in the showcases, a lighted Christmas tree, holiday decorations, all make Christmas shopping easy and pleasant, as the Valley Electrical Supply Company of Fresno found last year in its store.

ATMOSPHERE is created to good effect in each of the three window displays shown here. The upper left is that of the Idaho Power Company, featuring a nationally advertised line of electrical merchandise. The lower left window won second prize in the nation-wide Christmas window contest conducted by Westinghouse last year. It is the window of the Electric Appliance Company of Denver. The lower right is a window display used in all of the branch offices of the Pacific Power & Light Company last Christmas. Christmas display material furnished by manufacturers was used in each of these windows with excellent results.

What to do 'till Santa comes---

CRYSTALLIZED, much as the very mists of the higher atmosphere are crystallized into the snowflakes and icicles which make Christmas so colorful an event in everyone's life, the ideas which have solidified into bigger Christmas

A carload of cleaners Santa Claus is bringing to the housewives via The Washington Water Power Company. R. B. Carter, Northwest distributor of the Eureka cleaners, is seen helping Santa distribute his gifts.

season business for electrical merchandisers are to be found here. Check over this meaty presentation of sales methods and plans and see if your store cannot employ one or many of them to your benefit this Christmastide.

With plenty of stock, well chosen, and of high-grade merchandise such as requires little if any after-Christmas servicing; with sufficient trained or experienced help to sell your goods courteously to the customers, you may find it well to:

Plan special offers. Department stores use this method continuously. A feature price on some one appliance, or combination offers on two or more appliances, a convenience tap or some small premium, will bring many to your store to be shown and sold major appliances.

Arrange demonstrations. One southern company uses an out-of-door sales room. Window demonstrations are effective, but best of all are offers to demonstrate in the homes.

Telephone for prospects. An intelligent salesman at the telephone can call hundreds and interest them in special offers, appliances, and service, getting many good prospects.

Dress the store. Create the holiday atmosphere in your store. Make it a Christmas headquarters. No one can utilize colored lighting effects as can the electric dealer. Not only put up festoons and wreaths, **illuminate** them. Make your store the brightest, prettiest, most colorful place in town.

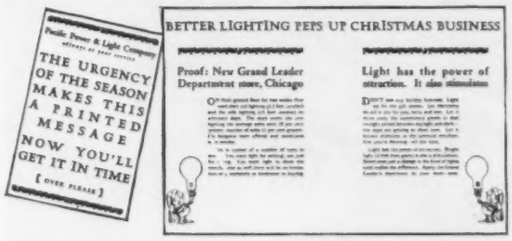
Tony Sarg, the well known illustrator and creator of the marionettes, designed The Society for Electrical Development's annual cooperative window display for 1925, which is available through the Society. As might be expected, Mr. Sarg has departed from the customary interpretations of Santa Claus, and has presented the idea of electrical gifts for the whole family in an exceedingly clever manner.

Dress the windows. Nothing is so important in selling merchandise as the well lighted, well planned window. Window competition is keen these days, especially at Christmas. You can outshine them all for color, illumination. If you haven't facilities for window decoration, every manufacturer of electrical goods can provide you with excellent material at very nominal cost. Originality and brightness are your two big assets. See them.

Advertise thoroughly and well. Use carefully planned newspaper space. Make advertising your salesman. Tell why electrical appliances are superior to old-fashioned housekeeping methods. Make terms attractive, and emphasize the service you are prepared to render.

Mail Circulars. Revise your mailing list. Put your Christmas specials on the backs of your envelopes. Mail circulars with all letters. Your manufacturer or jobber can supply you well prepared circular or broadside material.

Use billboards. If you can get the dealers of your city together on billboard advertising,


Public Power & Light Company
THE URGENCY OF THE SEASON MAKES THIS A PRINTED MESSAGE NOW YOU'LL GET IT IN TIME
[OVER PLEASE]
BETTER LIGHTING PEPS UP CHRISTMAS BUSINESS
Proof: New Grand Leader Department store, Chicago
Light has the power of attraction. It also stimulates

Aimed at the merchant who would sell any kind of Christmas merchandise, this message was mailed to retail store proprietors early in December, 1924, and resulted in increased window lighting installations and lamp sales.

all will benefit. If not, use a few yourself. The 24-sheet posters are available from many manufacturers or the Society for Electrical Development.

Other advertising. Car cards in street cars, stickers for windshields, banners for your store's automobiles and trucks, electric signs, illuminated window signs, Christmas wrapping paper carrying your store name—all these are helpful. Advertise delivery service, say, with "night before Christmas" delivery. Strike some original note in your store advertising and carry it on emphatically throughout the Christmas season.

Promote electrically lighted trees. The example set by Denver, and many other cities for contests with prizes for the best lighted Christmas trees, in selling every tree-lighting outfit in the city, is one worth following. Read of Denver's experience in the feature section of this issue, and then promote Christmas-tree lighting in your community.

The season will reward any dealer who pushes electrical merchandise this Christmas. For two or three years the idea has been advertised. This year should see the finest results of all.

ELECTRICAL Christmas giving was given a strong impetus by the carefully directed advertising of last year. In many instances co-operative advertising by all the dealers of a community, under the leadership of its electric club or league, was responsible for increased electrical sales to all.

NEWS OF THE INDUSTRY

Senate Committee Hears Plans of Boulder Advocates

The United States Senate Committee on Irrigation and Reclamation, in a two-day hearing, held in Los Angeles Oct. 26 and 27, heard described the problems pertaining to the proposed dam on the Colorado River and the All-American Canal. No power companies were invited to take part in the proceedings. It is understood that Arizona injected itself into the proceedings against the wishes of the association.

Los Angeles municipal-ownership advocates were strong supporters of a high (500 to 600-ft.) dam while Arizona favored a low (95 ft. upwards) dam at the present time for flood control only.

Los Angeles Bureau of Power and Light advocates were represented by E. F. Scattergood, chief electrical engineer of the city's water and power department. Mr. Scattergood outlined the policy of this group when he said, "Los Angeles stands ready to contract for all of the Boulder Canyon power that other communities do not need or desire. The city of Los Angeles stands ready to provide construction funds in proportion to its power allotment for the total cost of the dam and storage project, or for such portion of that cost as may not be provided for by Congress."

Representatives of Imperial Valley interests painted a picture of devastation and ruin with probability of great loss of life that is certain to come upon their portion of the country in the event that flood-control measures are not put into effect immediately.

That flood control is the only leverage which can be used effectively on Congress in getting any federal assistance in connection with the development of the Colorado River was brought out by Senator Key Pittman of Nevada when he stated, "There is, in my opinion, one argument which Congress cannot handle—the imperative need for flood protection of the Imperial Valley. Insist on flood control and flood control only, and you will have the right kind of dam, one sufficient for both power and water supply."

William Mulholland, veteran chief engineer of the city water department, devoted his energies to stressing the city's increasing water needs. "The only project in which Los Angeles is interested is a high dam at Boulder Canyon." He declared, "If any other project is undertaken this city will not be justified in having any part in it."

Mr. Mulholland expressed grave doubt as to the feasibility of carrying out a gravity-canal project from a dam at Bridge Canyon, which is mentioned as a future possibility in the report of E. C. La Rue made to the federal government recently.

The following comprised the committee: Senator Charles L. McNairy of Oregon, chairman; Senators Johnson and Shortridge of California, Ashurst of Arizona, Kendrick of Wyoming, Oddie of Nevada, Dill of Washington, Phipps of Colorado and Pittman of Nevada. The committee is making a tour of inspection through southern California, Arizona and Nevada so as to be able to acquire first-hand information concerning the much befogged question of the future development of the Colorado River.

All Colorado River Development Halts Till States Agree

All development of the water resources of the Colorado River and its tributaries, including the Gila and every other stream in the basin, is to be suspended until the seven states concerned can agree.

The determination to take this action, it is assumed, took place at the cabinet meeting Oct. 27. It seems to have been the concensus of opinion to let the states of the basin understand unmistakably that they must reach some agreement among themselves before any development will be allowed to proceed throughout the vast territory drained by the Colorado.

Mr. Girand, while admitting great disappointment that his Diamond Creek development cannot be begun at once, sees in this decision a new assurance that he is certain to secure his license in time. While the wording of the commission's resolution calls for the suspension of all licenses "for a reasonable time," it is understood that the full intent is to make the period as long as may be necessary to secure agreement. In the resolution the opinion is expressed "that constructive governmental policy requires that the states affected should, and they hereby are earnestly urged to, reach as speedily as possible an agreement among themselves for the division of the waters of the river system, all to the end that thereupon development may proceed unchallenged upon interstate grounds."

The Southern California Edison Company, Los Angeles, has applied to the Federal Power Commission for a preliminary permit covering the Mohave Canyon site on the Colorado River. It is proposed to construct a concrete dam 168 ft. high at a point in the canyon two and one-half miles below Topock. The application is in conflict with several other applications perviously filed.

Western Utilities Company Buys Evans Light Company.—The sale of the Evans Light Company, operating in Malad, Idaho, to the Western Utilities Company has been announced. This plant was built in 1906 and has been in continuous operation since that time.

Report on Los Angeles Electric Power Supply Made Public

Stressing the rapid increase in the demand for electric power in southern California and urging that immediate steps be taken to procure additional power through development of the Colorado River, the report prepared for the Citizens Water and Power Committee of Fifteen of the Chamber of Commerce of Los Angeles has been made public. This report was prepared by L. S. Ready, chief engineer of the California Railroad Commission, and H. G. Butler, consulting engineer and state power administrator for the state in 1920 and 1924.

Briefly stated, the essential points of the report are as follows:

(1) The demand for electrical energy in southern California is increasing at such a rapid rate that immediate steps should be taken by those responsible for the power supply toward obtaining developments on the Colorado River.

(2) There should be no difficulty or economic waste under co-ordinate development in the absorbing of the power to be produced from the proposed Boulder Canyon development, when it becomes available.

(3) Energy from the Colorado River is the cheapest hydroelectric energy that can be obtained for southern California.

(4) The steam plants of the Southern California Edison Company are adequate to furnish standby service to the city until 1927.

(5) Two additional interconnection points should be made between the Southern California Edison Company and the Bureau of Power and Light of Los Angeles.

(6) The Bureau of Power and Light should have steam standby service under its own control. A unit of 25,000 kw. should be available in 1927.

California Oregon Power Company Acquired by Byllesby

Control of The California Oregon Power Company has passed into the hands of H. M. Byllesby & Company of Chicago, according to official announcement made in San Francisco Nov. 4 by John D. McKee, president, and J. D. Grant, chairman of the board of the Western company. Transfer of ownership was effected through an arrangement made by these two men acting for themselves and other stockholders whereby common stock of California Oregon will be exchanged for stock in a new company to be organized and controlled by the Byllesby interests.

The system of The California Oregon Power Company, located in northern California and southern Oregon, is a strategic link in the Pacific Coast interconnected transmission system, connecting as it does a large group of utilities in California with a second large group in Oregon and Washington. With other Western properties under the control of the Byllesby organization, it gives this company the nucleus of a large interconnected system.

H. M. Byllesby & Company already own the Mountain States Power Com-

pany, in Oregon, the Western States Gas & Electric Company, the Coast Valleys Gas & Electric Company, the San Diego Consolidated Gas & Electric Company, the Sierra & San Francisco Power Company and the Market Street Railway Company of San Francisco, all in California.

The Mountain States Power Company, operating in Oregon in the Willamette Valley and in northern Idaho and in Wyoming in the vicinity of Casper, has steam plants totaling 5,130 kw., hydro plants with a capacity of 4,250 kw., a connected load of 50,000 kw., and serves 24,554 consumers. It is interconnected with The California Oregon Power Company through a 130-mile, 110-kv. transmission line at Springfield, Ore. At Salem, Ore., it ties with the system of the Portland Electric Power Company.

The Western States Gas & Electric Company serves territory in the vicinity of Stockton, Eureka and Richmond, Calif. Its Eureka properties are tied with the system of the Pacific Gas and Electric Company at a point easily within reach of an extension from the lines of the California Oregon system. Western States has an installed capacity of 27,080 kw. in hydro and 9,650 kw. in steam, a connected load of 72,250 kw., and serves 35,556 consumers. Its largest hydro station is the El Dorado plant on the American River. This company recently acquired the water rights of the Feather River Power Company on the Middle Fork of the Feather River and has announced the construction of a 70,000-kw. plant at Bean Creek to begin in the spring of 1926.

The Coast Valleys Gas & Electric Company operates in the vicinity of Salinas and Monterey, Calif. It serves 7,689 consumers and has a connected load of 20,357 kw. It purchases energy from the Pacific Gas and Electric Company.

The San Diego Consolidated Gas & Electric Company serves a region in the extreme southern section of California. It is interconnected with both the systems of the Southern California Edison Company and The Southern Sierras Power Company. A second interconnection with this latter utility is planned for the near future. The San Diego company serves 45,941 consumers with a connected load of 82,683 kw. It operates two steam plants in San Diego with a total capacity of 31,000 kw.

The Sierra & San Francisco Power Company, now under lease to the Pacific Gas and Electric Company, serves the northern portion of the San Joaquin Valley and has a 104-kv. line extending into San Francisco. Its principal hydro station is the Stanislaus plant with a capacity of 34,000 kw. The major portion of its output is sold under contract to the Market Street Railway Company. It is tied with the system of the San Joaquin Light & Power Corporation at Newman.

The California Oregon Power Company has a total installed hydro capacity of 70,210 kw. largely concentrated in its two Klamath River plants, Copco No. 1, with a capacity of 25,000 kw. and the recently completed Copco No. 2 with a capacity of 30,000 kw.

This latest acquisition by the Byllesby interests has started conjecture as to the feasibility of the interconnection of the major portion of the properties owned by that company with the proposed Bean Creek plant as a starting point. Such a procedure would result in the formation of a 110-kv. bus extending from Stockton on the south to Salem, Ore., on the north, a distance of approximately 600 miles.

The accompanying map shows the location of the Byllesby properties in California and Oregon.

New Fire Alarm System of Local Design and Manufacture Installed in Los Angeles

What is said to be the greatest forward step in the improvement of fire-alarm systems yet designed is presented in the new central fire-alarm equipment for the city of Los Angeles. The major work of installing this system has just been completed. The essential feature of the new system is the patented Degen grounding device which provides immunity to any failure in functioning by providing for alarms to be received over a circuit even though that circuit be broken.

A circuit interruption merely causes the alarm to be transferred over any other circuit with an instant of lost time. At the same time the trouble is recorded automatically at the central station, enabling the operator to transmit the alarm by a simple manipulation of switches. Individual emergency "dynamotors" for each district secure further insurance against interruption of service.

Under this new system when an alarm is turned in from any box in any part of the city it is recorded in duplicate on the paper tape of a double-pen or push register. This register automatically records the time of receiving. At the same time a single-stroke bell strikes the number of the box, a red light appears on the line board indicating which circuit is operating, and a red light blinks on the chief operator's desk, showing the number of the operating circuit and blinking the number of the box. The register and the line pilot lamps remain lighted until extinguished by the operator.

After the second round is received from the box and checked, the chief operator transmits the box number to all engine houses over the primary or gong circuits. All signals sent out over either the primary or secondary circuits are recorded on a paper tape by the recorder which also automatically records the time of sending. Second, third, fourth or other special signals are received and transmitted in the same manner.

Another special feature of the system is the method of testing the boxes. By this system, boxes may be tested at the will of the chief operator without in any way interfering with the transmission or reception of alarm signals.

In case of an open circuit the pilot lamps light, indicating the number of the circuit, and an audible signal is received on a bell. Whether the ends of the open circuit are clear or grounded the signals are received on each side of the break in a manner similar to that outlined above for normal operation. The only manipulation necessary on the part of the operator is the throwing over of certain switches, which puts the circuit in condition. Should a ground develop on any circuit an audible and visual signal is given, indicating the particular circuit grounded. This circuit then is switched over to an individual "dynamotor."

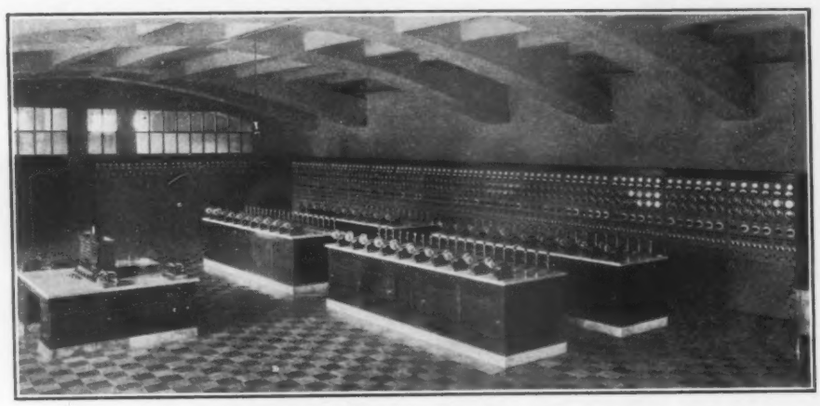
Like the majority of fire-alarm systems used throughout the United States, the Los Angeles system is of the closed-circuit type but is designed for a common battery with a motor generator set and a battery floating on the line.

The equipment in its entirety cost a little over one million dollars and was covered by a recent bond issue. The equipment is known as the Degen automatic fire alarm system, designed by Louis Degen, consulting engineer for the city of Los Angeles, and was produced in Los Angeles by the firm of Brown & Pengilly.

The system is designed to care for at least 5,000 alarm boxes which, it is planned, will take care of the city's needs for many years to come. A major portion of the system is in operation, and the rest will be completed as fast as the new boxes can be installed.

Puget Sound Company Builds New Power Line.—The Puget Sound Power & Light Company has started construc- of a new power line along the Olympic Highway between Elma and Montesano. The line will cost $17,000 and will be of the latest construction throughout.

Colorado Springs Office Closed.—With the purchase of the Western Public Service Company by Stone & Webster, offices at Colorado Springs, Colo., have been closed, and the headquarters of the new northern division have been moved to Scotts Bluff, Neb., with Samuel P. MacFadden as the general manager.



Central control station of the new fire-alarm system just placed in service in Los Angeles. At the right may be seen the wire chief's desk; next the signal-receiving tables, and to the right and to the rear the signal-line panels.

Utility Men to Address Students in Northwest Colleges

As an important activity of the Public Relations Section of the Northwest Electric Light and Power Association this year, the Committee on Co-operation with Educational Institutions has arranged for speakers from the power companies to present a series of subjects throughout the year to students in electrical engineering and business courses at the Washington State College, Pullman, and the University of Idaho, Moscow. This was the result of a meeting held Oct. 16 by this committee, in company with professors and department heads of the two institutions, in the office of Edward C. Johnson, dean of the college of argiculture, Washington State College. Under this plan, subjects of more or less general interest such as rates, regulation, franchises, financing and similar topics, will be presented by those officials of Northwest companies best fitted by their own experience to discuss such subjects, these men being chosen from a number who have volunteered their services for this work.

A. J. Priest, attorney for the Idaho Power Company, Boise, chairman of the committee, presided at the meeting, which was addressed by Lewis A. Lewis, sales manager, The Washington Water Power Company, Spokane, president of the association, and by W. H. Ude, director of public relations of The Washington Water Power Company, chairman of the Public Relations Section. Representatives of the two universities present, besides Dean Johnson, were: H. V. Carpenter, dean of the college of engineering; H. W. Cordell, professor of economics; R. D. Sloan, professor of electrical engineering; L. J. Smith, associate professor in agriculture; and H. L. Garver, special investigator in rural electrification, all of the Washington State College; and Ivan C. Crawford, dean of the college of engineering, and H. C. Dale, professor in school of business, both of the University of Idaho. All the educators expressed themselves as heartily in favor of the plan as adopted at the committee meeting.

Arizona Makes Own Application for Colorado Project

The board of directors of state institutions for Arizona has applied to the Federal Power Commission for a preliminary permit for a development on the Colorado River at the Bridge Canyon site in Mohave County, Ariz. It is proposed to erect a rock fill or concrete dam, to be so constructed as to make possible an ultimate height of 1,000 ft. Such a dam will develop 1,000,000 hp., it is estimated. The purpose of the improvement is to impound water for irrigation, to reduce flood danger, to provide power for pumping and other purposes and for marketing, and to provide water free from silt.

Fred T. Colter, of Phoenix, Ariz., on behalf of the state of Arizona, has asked for a preliminary permit covering a storage dam in Glenn Canyon and a diversion dam at Bridge Canyon. No explanation is made in the application as to the conflict with the application filed by the state for rights at Bridge Canyon only.

Majestic Conducting Campaigns in Many Western Papers

Two extensive newspaper campaigns, one featuring its electric waffle iron and the other its electric heaters, are being conducted by the Majestic Electric Appliance Company of San Francisco in cities west of the Mississippi River. The electric waffle-iron campaign started Sept. 30 and will continue until Dec. 18 in thirty-one newspapers in California, Oregon, Washington, Idaho, Texas, Nebraska, Missouri and Wisconsin, with a total aggregate circulation of 1,298,512. The advertisements will be 3 col. by 10 in. in size and total 6,300 lines or 450 col. in. A feature of the campaign has been the preparation of six dealer tie-in advertisements, mats of which are furnished the newspapers with space for the dealer's name. Papers report satisfactory results from the use of these tie-in advertisements, which range from one col. by one in. to two col. by four in.

The electric heater campaign is running in thirty-six daily papers in California, Oregon, Washington, Arizona, Colorado, Texas, Missouri, Wisconsin, Nebraska and Minnesota, with a total of 1,817,575 circulation. It began Oct. 12 and will continue until Nov. 30. The advertisements, of which there are fifteen, aggregate 3,780 lines or 270 col. in. The same system of dealer tie-ins which was worked out for the heater campaign has been prepared for the waffle irons.

All copy for the two campaigns was prepared by the Lockwood-Shackelford Company of San Francisco.

City and Railroad Dispute Dam Site Grant to Garland

An incorporated city and a transcontinental railway seek to block the application of C. C. Garland of Tacoma in his efforts to secure rights for the establishing of a 730,000 acre-ft. reservoir near Mayfield, Wash.

The application, which Mr. Garland filed recently with R. K. Tiffany, state supervisor of hydraulics, concerns a site on the Cowlitz River, a tributary stream to the Columbia River, and incidentally a site for which he first filed application, as assignee for the City of Chehalis during December, 1923. Chehalis first intended the developing of the site as a power source for municipal distribution and later assigned the application to Mr. Garland, who apparently later severed his connections with the Chehalis project. The city of Chehalis, through attorneys, now seeks to hinder Garland from making a personal application on the site and protested officially at the one-day hearing which was held a short while ago before the hydraulics board but was not completed and has been set over for completion indefinitely.

Another protest against the granting of the Garland application has been filed by H. B. Earling, general western representative of the Chicago, Milwaukee & St. Paul Railway, who charges that the dam and reservoir, when completed as outlined by Mr. Garland, would raise the waters of the Cowlitz River a distance of 20 miles and damage a previously granted right-of-way. The railroad company claims that it may use eventually this right-of-way in the connecting of its present line from Tacoma to Kosmos with a possible tributary line along the Tilton and Cowlitz Rivers.

In his personal application, Mr. Garland stated that if his petition was granted, the actual work of pouring concrete for the tunnel forms and dam would be started well under a year's time. He did not specify definitely the exact size or output contemplated for the hydroelectric plant, which was mentioned in the application as "intended for the distribution of light, heat current and for other electrical domestic needs."

One of the applications made by Mr. Garland, in which permission was sought to erect a 100-ft. dam at Mayfield, has been canceled automatically by the recent issuance of a permit for the erection of a 25,000-acre-ft. reservoir by the state supervisor of hydraulics to H. W. Crozier, representative of the Cowlitz, Chehalis & Cascade Railway. (Journal of Electricity, Aug. 15, 1925, p. 147.) The site, at which a dam 200 x 50 ft. is contemplated, is near Mossyrock, Wash., which is about six miles above Mayfield. Work on the dam and power house will be started within eighteen months, as stipulated in Mr. Crozier's application.

Another application which conflicts with one filed by Mr. Garland is that recently filed by R. W. Lincoln of Portland, Ore., on a 1,500-acre tract lying in the Toutle River valley a few miles east of Kelso, Wash. This application asks permission to erect a 110-ft. dam, 600 ft. long, and install an 8-mile pipe line and canal to conduct the water from the reservoir to the proposed power house. The labor and concrete needed for the erection of the dam alone would exceed $1,000,000, as stated in the application, which would indicate that 2,000 sec.-ft. of water would be appropriated from the Toutle River, which flows into the Cowlitz River from the Cascades. Mr. Garland early in 1923 made original filing on the tract now sought by Mr. Lincoln but has taken no further steps toward securing the granting of the application, according to R. K. Tiffany, state supervisor of hydraulics.

Cooking Schools at Salt Lake and Ogden Draw Big Crowds

Two electric cooking schools, one in Salt Lake City and the other in Ogden, Utah, recently were held simultaneously for one week. The school in Salt Lake was conducted by the Salt Lake Telegram, and that in Ogden by the Ogden Standard-Examiner. In both cities a number of merchants and electrical firms, including the Utah Power & Light Company, co-operated with the newspapers in broadcasting the message of electric cooking to the housewives.

Cooking contests in which the winners received valuable prizes offered by various firms, were conducted each day. Lectures and demonstrations were given by Miss Ina Scrivner in Salt Lake City and Miss Lulu Boyes in Ogden, presenting to the housewife by actual application the real meaning of electricity as an eliminator of drudgery in the home.

A large number of booths were provided by merchants, in which their wares were displayed, adding to the attractiveness of the interior arrangements.

Attendance at both of these schools surpassed that of the previous ones, and there was a marked display of interest on the part of those present, that seemed to increase each day.

Cooking schools where food actually is cooked by electricity are proving to be one of the best methods of carrying the electrical message.

One of the large crowds of women attending the electric cooking schools conducted by the Utah Power & Light Company, through the newspapers of Salt Lake City and Ogden. Merchants assisted the school by having display booths in which electrical appliances were placed on exhibition

Two Bills Proposing State-Owned Power Filed in Oregon

Making good the expressed intention of certain semi-political groups in Oregon, there have been filed with the secretary of state two proposed measures looking to the establishment of state-owned power systems. This filing is required under a law for the purpose of having the bills titled by the attorney general preparatory to the circulation of initiative petitions which, if sufficient signatures are obtained, will entitle these measures to a place on the ballot to be voted on by the people at the next general election in 1926. Both measures involve an amendment to the constitution of the state.

The first, sponsored by the Housewives' Council, Inc., Portland, has been called the Oregon Water and Power Board Development Measure, and seeks to vest the control over the conservation, development, storage and distribution of electric energy and water for irrigation and domestic purposes in a board of five elective members, the personnel of the first board being named in the amendment. Provision is made for the issuance of state bonds in an amount not exceeding five per cent of the state's assessed valuation, and for an initial appropriation from the general fund of the state of $250,000 for an administrative fund, later returnable from the revolving fund created under the proposed act.

The title given to the second proposed measure, which was prepared and filed by the Oregon State Grange, is the Water, Water-Power and Hydroelectric Energy Constitutional amendment. This measure would authorize the state to control and develop the hydroelectric energy within the state, and to contract with political subdivisions and others for its transmission, distribution and sale; to maintain and operate plants in this connection, authorizing state credit and indebtedness to provide funds for the purpose of the act. As originally filed the measure placed no limit on the amount of bonds which might be issued under it, but a later filing restricted such bond issues to an amount not exceeding four per cent of the total assessed valuation of the state. Differing from the first proposed amendment, which attempts to specify the machinery of administration, that proposed by the grange places the administrative detail in the hands of the legislature.

Company to Serve Electrified Railway in Northwest

Pointing to the electrification of a portion of the Great Northern Railway in the Washington area, and involving the expenditure of $10,000,000 in the developing of a total output of 100,000 hp. from a power house that will use all but 40,000 acre-ft. of the water flowing from Lake Chelan, a permit to the Chelan Electric Company, a subsidiary to the Great Northern, was issued late in October by R. K. Tiffany, state supervisor of hydraulics.

As stated in the application the actual work of constructing the dam, power house and tunnel lines will be started prior to July 22, 1926, with the provision being made that the work is to be completed within three years.

A total fall of 400 ft. will be utilized by the plant which is to be located near the Columbia River, passing within a few miles of the lake. The dam, which will raise the level of the lake 10 ft. during the flood season, will be placed at a point approximately one-half mile below the lower end of the lake.

Through arrangements already completed, The Washington Water Power Company takes over the Chelan properties and site and will construct the project, and operate the plant when completed. (Journal of Electricity, Oct. 1, 1925, p. 263.) Provision is being made permitting the Great Northern Railway to purchase adequate power for the electrification of a portion of its Washington line within the next few years. The railroad intends to electrify its lines from Spokane through central Washington. A tunnel eight and a half miles long that will eliminate many miles of grades, snowsheds, and difficult roadbed, will call for the major electrification. This tunnel is to run from Scenic to Berne, through the Cascade range.

The Washington Water Power Company will place Victor H. Greisser, chief engineer, in full charge of the work of the new project. Arthur Turner, formerly chief engineer in the Columbia River Basin Survey, will be construction engineer in the Lake Chelan power project.

Luminaire Company Announces Change in Ownership

The Holophane Glass Company, Inc., of 342 Madison Avenue, New York, N. Y., with factory at Newark, Ohio, and the Holophane Company, Ltd., of Canada have been acquired by a group made up largely of executives and employees who have been associated with the Holophane company for periods varying from ten to thirty years.

The officers of the company now are: Otis A. Mygatt, president; Charles Franck, vice-president and general manager; Joel B. Liberman, vice-president and treasurer.

The following will continue in their respective positions: William A. Dorey, chief designing engineer; William A. Ingler, superintendent of the works; Thomas W. Rolph, managing engineer of the street lighting department, and Davis H. Tuck, engineer in charge of industrial lighting. Edward L. Bradbury will be sales manager.

Sand in Generators Denied by Seattle Superintendent

Charges circulated in the Northwest to the effect that, owing to faulty construction of the sand trap, the Skagit power house of the City of Seattle would have to be shut down have been denied by J. D. Ross, superintendent of the City Lighting Department. In a statement to a representative of the Journal of Electricity Mr. Ross says:

"The fact is that the floor of the tunnel is free of sand and gravel. Skagit River is a rather wild one, but if any small gravel does pass the screens during high water it goes through as it is a gravity tunnel with 250-ft. drop in two miles. The wear on the wheels, inspection from time to time shows, is no greater than would be expected in any stream carrying glacial silt."

U. S. Government Files Brief in Edison-Herminghaus Case

Upholding the contentions of the Southern California Edison Company in its case against the Herminghaus heirs, covering the question of riparian rights on the San Joaquin River, the United States government has filed a brief at San Francisco. This is the first time that the government has become a party in the case. The government's reserve rental interest in the power project, together with its desire to protect the public's interests in the matter of power development, are the reasons given for its present action.

An injunction now stands which prohibits the Southern California Edison Company from impounding the waters of the San Joaquin River. This restraining order was issued by Judge J. E. Wooley, sitting in the Superior Court of Fresno. (Journal of Electricity, March 1, 1925, p. 185.) If this decision of Judge Wooley is upheld by the upper court, it is pointed out in the brief filed by the government that any further hydroelectric development will be prohibited and this basic source of natural wealth remain undeveloped.

Order Equipment for Eagle Rock Substation Improvement

Anticipating the need for additional capacity in its Eagle Rock substation when the third Big Creek-Los Angeles 220-kv. transmission line is completed, the Southern California Edison Company has placed an order with the Westinghouse Electric & Manufacturing Company for four 25,000-kva. 220/60-kv. transformers, together with six new circuit breakers, type G 22, 187 kv., made expressly for use on a 220-kv. grounded neutral system. Fourteen additional circuit breakers of the same type have been ordered for other locations on the Vincent line.

At present there is no 220-kv. switching equipment in the substation, the 220-kv. lines passing through auto transformers — 220/150-kv. — without switch connection. With the installation of the new circuit breakers it will be possible to do any switching necessary on the 220-kv. circuits.

Electrola, New Talking Machine, Announced by Victor Co.

How electrical research in one industry may affect the development of an allied industry is illustrated strikingly by the perfection of a talking machine utilizing the principle of vacuum-tube amplification that has just been announced by the Victor Talking Machine Company, Camden, N. J. The new instrument, which is to be placed on the market by the Victor company as the Electrola, uses the disc record, but instead of amplification of sound through a diaphragm and horn the sound waves taken from the record are converted into pulsating currents, which are amplified through an audio amplifier in the same manner as are radio impulses.

In announcing the Electrola, the Victor company states that it was developed as a result of simultaneous experiments by the Radio Corporation of America, the General Electric Company and the Westinghouse Electric & Manufacturing Company. Its outstanding characteristic is announced to be the reproduction of a range of frequencies far beyond anything known

Pit 4 Diversion Dam and Intake to Be Built at Once

Announcement is made by F. A. Leach, Jr., vice-president and general manager of the Pacific Gas and Electric Company, San Francisco, that orders have been approved for the construction of the Pit 4 diversion dam and intake structure. This is the next project in the company's power development program on the Pit River in Shasta County. This diversion dam is to be located about 1½ miles downstream from the Pit 3 power house which was placed in operation July 18 of this year. (Journal of Electricity, Aug. 1, 1925, p. 105.)

Detailed plans and designs for the dam and tunnel intake structure have been completed. The new dam will raise the water level in Pit River 40 ft. and will have a crest length of about 410 ft. A reservoir of 1,550 acre-ft. will be formed by the diversion dam. Water will be backed up to the Pit 3 tailrace. The prime reason for the construction of the diversion dam and intake structure at the present time is to provide an afterbay for Pit 3. With this 1,550 acre-ft. reservoir available it will be possible to "peak" on Pit 3, or operate it in accordance with peak demands and still maintain the required steady flow of the Pit River below the power sites.

Construction of this dam calls for an expenditure of $1,750,000. Cost of the entire Pit 4 project, exclusive of railroad and transmission lines, is estimated at $14,500,000. The work approved will be carried on during the winter months, employing a minimum of 300 men.

About ten miles of additional railroad construction, costing $530,000, will be extended from Pit 3 power house down the Pit River Canyon to the Pit 4 power house site. About 4 miles of this now is completed. The project is the fifth of a series of eight to be built in the Pit River section at a total cost estimated to be in excess of $100,000,000. Hat Creek 1 and 2 and Pit 1 and 3 plants with a total installed capacity of 175,000 kva., have been completed and now are in operation.

O. W. Peterson, engineer of general construction, and the men who handled the construction of the Pit 3 job under the direction of P. M. Downing, vice-president in charge of electric construction and operation, will be in charge of the construction of the Pit 4 project.

Northwestern Power System is Acquired by Puget Sound

Acquiring about ninety miles of transmission line and other electric light and power property in the Olympic peninsula from the Northwestern Power & Manufacturing Company of Port Angeles, Wash., the Puget Sound Power & Light Company has added Clallam, Jefferson and Kitsap Counties to the fifteen western and central Washington counties in which it already operates, according to a recent official announcement made by W. H. McGrath, vice-president of the company. The total area of the three counties thus added to the company's system is 3,902 sq. miles, and is to be connected with the mainland plants by means of a submarine cable, the cost of which is estimated at $360,000.

The property changing hands consists of a transmission line beginning at Port Angeles and extending through Sequim to Bremerton Junction, about seven miles southwest of Port Townsend. From this point a branch line goes to Port Townsend while the main line continues south, crossing Hoods Canal at Port Gamble and passing through Poulsbo and Keyport to Bremerton. Possession of the property will be taken by the Puget Sound Power & Light Company Dec. 1.

The transaction does not include the hydroelectric plant of the Northwestern company situated on the Elwha River, which has been supplying power to all points along the transmission line described. Under the purchase agreement the Northwestern company will continue to supply power from the Elwha plant until such time as the Puget Sound company shall have completed its submarine cable connection with the mainland plants.

The towns of Port Angeles, Sequim, Silverdale, Poulsbo and the North Pacific Public Service Company supplying Bremerton, which hitherto have been wholesale customers of the Northwestern company will, after Dec. 1, be wholesale customers of the Western Washington Power Company, a subsidiary of the Puget Sound Power & Light Company.

Additional Generating Equipment for Valmont Steam Plant

An order has been placed by Henry L. Doherty & Company with the General Electric Company for additional generating equipment to be installed in the new Valmont plant of the Public Service Company of Colorado, near Boulder. The initial order covers the complete turbo-generator rated at 25,000 kw. Condenser orders have been placed with the Wheeler Condensing & Engineering Company. Switchboard and cooler orders have not been placed yet.

The construction of the present boiler house and turbine rooms is considered adequate to house the new equipment, according to engineers of the company. With the new equipment the plant will have a capacity of 45,000 kw.

Mount Baker Development Company Applies for Rights on Bagley Creek.—Predicting intention of the Mount Baker Development Company of Bellingham, Wash., to proceed at once with development of its contemplated power project on Bagley Creek, tributary to the North Fork of the Nooksack River in Whatcom County, B. M. Huntoon, manager of the Bellingham concern, has applied to the Washington state supervisor of hydraulics for permission to build a $5,000 reservoir on Bagley Creek for storage of 100 acre-ft. of water for power purposes. Construction of the reservoir, according to the application, is to begin by July 1, 1926, and is to be finished by Nov. 1, 1927. The Mount Baker Development Company filed its original application, which called for the appropriation of 20 sec.ft. of water from Bagley Creek for power purposes on Oct. 16, 1924. The project proposed to develop 600 hp. at a 350-ft. head. The estimated cost of the project was given as $50,000.

Power and Irrigation Project Contemplated by California Farmers.—Formation of an irrigation district in Placer County, Calif., was discussed recently at a meeting held at Lincoln. Land owners will be interviewed to get their stand on plans which provide for the irrigation of 50,000 acres of land. The plan is similar to that followed by the Oakdale and South San Joaquin Irrigation Districts in cooperation with the Pacific Gas and Electric Company whereby the later develops power from water supplied by the irrigationists and later returned to them. (Journal of Electricity, June 15, 1925, p. 602.) A dam would be built across Bear River and the water brought through the Pacific Gas and Electric Company's ditch to its Wise power house. Plans call for the erection of a power house about four miles below the Wise plant. An effort would be made to sell the energy to the Pacific Gas and Electric Company.

A.I.E.E. News

Three Lectures to Be Delivered by Illuminating Engineer.—Miss Beatrice Irwin, illuminating engineer, Associate in Arts of Oxford University, England, and inventor of the Irwin Color Filter System of Illumination, will deliver three lectures at the Fairmont Hotel, San Francisco, on Nov. 24, Dec. 1 and Dec. 8, respectively, at 815 p.m. The subject of the first lecture is announced as "Color Science and Psychology (Its Application to Decoration and Illumination); the second, "Art, Industry and Illumination in Europe"; and the third, "Morocco, Ancient and Modern." The first and third lectures will be illustrated.

San Francisco Section will hold its next meeting in the new home of the Pacific Telephone & Telegraph Company at 140 New Montgomery Street, as the guests of the telephone company. The speaker of the evening will be C. W. Burkett, consulting engineer for the telephone company, who will discuss the many interesting electrical and structural features of the new building. The exact date has not yet been settled upon, but will be early in December.

Vancouver, (B. C.) Section announces its next meeting for Dec. 1. The subject to be presented is "Developments in Radio Communication." The speaker is to be H. Vickers, Ph. D., M. Eng., M. Sc., professor of electrical engineering at the University of British Columbia. The place of meeting is not yet settled.

Denver Section will hold its regular meeting Friday, Nov. 20, at the Elks' Club. As usual, dinner will be served at 6:15 p.m. preceding the session. "A Review of the Epoch-Making Scientific Advances Within the Last Hundred Years" will be the subject upon which B. F. Howard, electrical engineer of the Mountain States Telephone & Telegraph Company, will speak.

News of the Electragists

Fundy's Electric Shop, formerly located at 526 Third Street, San Bernardino, has moved into a new store at 390 E Street, where it will have additional floor space.

Claude Bourbon, San Diego contractor, recently was awarded a contract by the Navy for the construction of an 11,000-volt fiber duct line at the Chollas Heights high-powered naval radio station.

Clyde L. Chamblin of San Francisco has returned from a trip to Chicago where he attended the executive committee meeting of the National Electric Light Association. Mr. Chamblin represents the electragists on this committee.

Correcting an Error.—The stock of the Poindexter Electric Company of Denver, Colo., was not sold to G. A. Sechler, a contractor-dealer of that city, on a court order following the death of Mr. Poindexter, as reported in the Oct. 15 issue of the Journal of Electricity. The Poindexter Electric Company is a corporation composed of four partners, of which Mrs. Poindexter is the largest stockholder. The business is to be continued as a jobbing and wholesale business on the same basis as when conducted by Mr. Poindexter.

J. C. Hobrecht, electragist of Sacramento, came into prominence as a golfer in the qualifying round of the city amateur golf championship held at the Del Paso Country Club course when he made a hole in one. A perfect mashie niblick tee shot struck on the green and rolled gently into the cup on the 123-yd. eleventh hole.

Bakersfield Contractors Are All Members of Association

Every electrical contractor in Bakersfield, Calif., is a member of the Electric Contractors Security Alliance of Bakersfield. This is a remarkable record, especially in view of the fact that there are twelve electrical contractors in this city with a population of less than 25,000 people.

Samuel Fingerhut, secretary-treasurer of the Electric Contractors Security Alliance of Bakersfield. He is proprietor of the Acme Electric Company.

Samuel Fingerhut of the Acme Electric Company has been very active in the organization since its inception, and its success has been due largely to his efforts as its secretary-treasurer. Other officers are: president—L. C. Stoll, L. C. Stoll Electric Shop; and vice-president—Max Klunder.

J. B. Sunny, of the **Sunny Electric Shop,** has opened a new store at 124 East I Street, Colton, Calif.

J. F. Edwards, formerly chief electrician at the Oro Grande plant of the Golden State Portland Cement Company, has opened the **Victorville Electric Company** at Victorville, Calif. He will specialize in industrial installations.

P.C.E.A. News

P.C.E.A. Technical Section Men Attend Detroit Meeting

Full co-operation between the Technical Section, P.C.E.A., and the Technical National Section, N.E.L.A., is to continue as one of the strong features of the activities of the local section. Toward this end seven representatives of the P.C.E.A. attended the group meetings in Detroit, Oct. 6-9. Those making the trip East for this purpose were R. R. Cowles, chairman of the Technical Section; H. L. Doolittle, past chairman and a member of the executive committee; J. W. Andree, chairman of the prime movers committee; P. E. Chapman, chairman of the Underground systems committee; Walter Dreyer, chairman of the hydraulic power committee; W. R. Frampton, chairman of the safety rules committee; and G. A. Riley, chairman of the overhead systems committee.

Outline of Activities of Prime Movers National Section

By J. W. ANDREE, Chairman Prime Movers Committee, P.C.E.A.

All geographic chairmen made reports of the activities of their respective sections. Final reports on the following subjects were read, discussed, accepted and ordered printed for distribution:

Stacks and Flues

Boiler and Turbine Room Instruments

Burning of Liquid and Gaseous Fuels

Operating Code Manual and Personnel

Preliminary Reports were made on the following subjects:

Oil and Gas Engines

Coal and Ash Handling

Higher Steam Pressures and Temperatures

Boilers, Superheaters and Economizers

Specifications

Distillation Products of Coal.

From round-table discussions the following conclusions were drawn:

The probability of the necessity of burning crude oil residium as a power-plant fuel is so remote that at the present time it need not be considered seriously.

With the present stage of development of power-plant material steam temperatures exceeding 750 deg. F. are not advisable, and where pressures exceeding 400 lb. are used reheating of the steam should be resorted to.

For steam pressures in excess of 500 lb., electric welding of joints is preferable to acetylene welding. Tongue-and-groove joints with metallic gaskets are giving satisfaction. Corrugated monel-metal gaskets also are giving satisfaction; however, some of the committee members were of the opinion that monel metal is too hard for gaskets. By-pass valves should be attached to the pipe at each side of the valve rather than to the body of the valve as the latter practice may cause leakage due to unequal expansion.

Caustic embrittlement of boiler drums may be avoided by caulking drum seams on the inside instead of on the outside. Water in the boiler should be watched closely and the concentration should not be less than 3 to 1, sulphates to carbonates.

After adjournment the prime movers committee in a body visited the 150,000-kw. Trenton Channel power plant of the Detroit Edison Company.

Meetings

Women's Organization Formed in Puget Sound Company

With a comprehensive program to follow a course of activity based on six definite purposes, the women employees of the Puget Sound Power & Light Company, Seattle, recently organized themselves into "The Women's Co-operative Association" of the company. These purposes, as adopted by resolution at the initial meeting of the organization last month in Seattle, are:

To provide a better opportunity for advancement of women employees and prepare them for greater responsibilities; to stimulate interest in the company's problems; to acquire and disseminate information concerning the problems and policies of the company; to educate in public speaking; to coordinate the work of women employees with that of the entire organization; to provide means for vocational education as a means of advancement.

The meeting, which consumed three sessions on two successive days, was attended by representatives from each of the six districts of the company, who will act as chairmen of their respective "district councils," through which the main organization will function. These district representatives were: central district—Nellie Duffy, Seattle; southern district—Bertie Neill, Vancouver, Wash.; eastern district—Doris Fennell, Wenatchee, Wash.; northern district—Mrs. Alice Harris, Bellingham, Wash.; northeastern district—Mrs. Hazel Redward, Everett, Wash.; southwestern district—Lois Cross, Tacoma.

The first session was opened by Col. H. G. Winsor, personnel officer, and later turned over to Miss Duffy after her election as chairman. Mabel Hall was chosen secretary. During the other sessions the meeting was addressed by W. H. McGrath, vice-president, and by Norwood W. Brockett, director of public relations. The newly formed organization will co-operate with the Women's Committee of the Northwest Electric Light and Power Association.

New Officers to Head Electric Transportation Association

Officers of the Electric Transportation Association for the ensuing year were elected at a recent meeting of that organization in San Francisco. The following are the new officials: H. A. Fore, Philadelphia Storage Battery Company, president; Arthur Walthew, Autocar Sales and Service Company, vice-president; H. H. Singletary, Pacific Gas and Electric Company, secretary-treasurer; and W. J. Walsh, assistant secretary-treasurer.

A report was received fom the committee on co-operative advertising. An outline of their recommendations will be sent to all members of the organization, and it is hoped that a definite decision will be reached at the next meeting.

Colorado League Has New Name and Emblem

With the change in name to the Electrical League of Colorado effective Nov. 1, officers of the old Electrical Co-operative League in Denver have changed everything bearing the old name, including the league emblem, which has been revised to indicate one of the new tipless lamps instead of the old clear type with visible filament. Official announcement of the change in name has been made to the industry (Journal of Electricity, Oct. 1, p. 261), and it is understood that a number of outlying communities are interested in being identified with the league movement. Membership in the league already includes all of the suburban central stations, in addition to the Public Service Company of Colorado. Headquarters will be continued at 402-403 Gas & Electric Building in Denver under the direction of S. W. Bishop.

New emblem adopted by the Electrical League of Colorado in a recent decision.

COMING EVENTS

Publicity Section, Pacific Coast Electrical Association—
Palace Hotel, San Francisco,
Nov. 19, 1925

Executive Committee, Pacific Cost Electrical Association—
Office of the Secretary, San Francisco,
Nov. 20, 1925

Commercial Section, Pacific Coast Electrical Association—
San Francisco,
Nov. 19-20, 1925

California Electrical Bureau—
Executive Committee Meeting, San Francisco
Nov. 19, 1925

California Electragists, Northern Division—
Quarterly meeting at Sacramento,
Dec. 5, 1925.

National Association of Railroad and Utilities Commissioners—
Kansas City, Baltimore Hotel
Feb. 9-12, 192(

S. F. Illuminating Engineers Name Officers

S. P. Russell, manager, H. B. Squires Company, was elected unanimously chairman for the new fiscal year of the San Francisco Bay Cities Chapter of the Illuminating Engineering Society at its meeting Oct. 26. He succeeds J. R. Cravath, consulting illuminating engineer, in the leadership of the chapter, having presided over the chapter during the latter's recent trip East.

Other officers named at this meeting were: L. F. Leury, consulting engineer, vice-chairman; C. D. Montieth, lighting sales engineer, Pacific Gas and Electric Company, secretary and treasurer; and on the board of managers: J. R. Cravath, retiring chairman; Dr. Percival Dollman, Optometrist; Miles F. Steel, Benjamin Electric Manufacturing Company; Clark Baker, National Lamp Works of the General Electric Company, and G. M. Simonson, Simonson & St. John, consulting engineers.

Book Reviews

GENERATOR AND MOTOR EXAMPLES

By PROF. F. E. AUSTIN, E.E., Hanover, N. H., author of "Induction Coils In Theory and Practice," "Preliminary Mathematics," "Examples In Magnetism," "Examples In Battery Engineering," "Examples In Alternating Currents," "How To Make Low-Pressure Transformers," "How to Make High-Pressure Transformers," "Laboratory Experiments With Direct Currents," "How To Make Telephones"; published by the author; 106 pages; 4 reference tables; 48 illustrations.

This is a practical little 106-page book dealing with the development of equations for the various efficiencies of electrical machinery. Consideration of motors and generators in their various types divides the book into two parts. While not intended as an elementary treatise, this book goes into the fundamental principles of dynamos sufficiently to give a clear understanding of the development of equations that is given in the text.

A short discussion of the theory of generators illustrated with problems opens the book. From this the text goes to the classification of generators and the development of equations for the efficiency of conversion, the electrical efficiency and the commercial efficiency of this type of machine. Enlarging upon this the author develops the equations of maximum output, and armature current and load resistance for highest efficiency. The all-day efficiency under various conditions is illustrated by problems.

The theory of the motor next is taken up. The equation for counter e.m.f. is developed and its relation to efficiency illustrated. After dealing with the efficiencies of a motor, the method of rating second-hand motors is shown.

Operating costs, financial efficiency and all-day efficiency are considered with regard to their practical applications.

This book should be of value to repair men in rebuilding machinery for new ratings. Designers and plant engineers should find it useful in calculating the size of individual units to be used in initial installation and the ultimate load for economical operation.

The text is couched in simple language, and each development well illustrated by one or more easily understood problems. All mathematical expressions used, with the exception of one or two developments in calculus, can be followed easily by the average practical worker. K.A.K.

Publication of Report on Oil Resources of United States Announced.—"American Petroleum: Supply and Demand" is a report of the country-wide survey made of the oil resources of the United States. The major factors of the investigation dealt with the future supply of petroleum and the future demand of the country for petroleum products in times of peace and war. The report was made by the Committee of Eleven of the American Petroleum Institute and published by the McGraw-Hill Book Company, Inc., New York.

Personals

E. H. Coe, vice-president and general manager of the Central Arizona Light & Power Company, Phoenix, has made rapid progress in the central station branch of the industry. In the fourteen years since his graduation from Stevens Institute of Technology, Hoboken, N. J., in 1911 he has spent a year with the Edison Lamp Works of the General Electric Company, Harrison, N. J., four years with the Niagara Lockport & Ontario Power Company, Buffalo, seven years with the Colorado Power Company, Denver—since 1923 as sales manager—and six months as assistant to the general superintendent of the Public Service Company, which acquired the former company in September, 1924. In February of this year Mr. Coe went to Arizona to join the Central Arizona Light & Power Company and the following June was promoted to the position he now holds.

J. B. Black, vice-president and general manager, Great Western Power Company of California, San Francisco, lately returned from an extended Eastern trip.

E. M. Hamilton, of Hamilton, Beauchamp & Woodworth, metallurgical engineers, San Francisco, has returned from Europe after an absence of four months and a half.

Sir Thomas O. Callender, more generally known in the electrical world as "Sir Tom," managing director of Callender's Cable & Construction Company, Ltd., of London, accompanied by Lady Callender and their son, has arrived for a visit in this country after an absence of some years. In addition to inspecting some of the most recent of the superpower plants in this country, including those established by his old friend, **Samuel Insull,** president, Commonwealth Edison Company, Chicago, he will inspect the recently established super-tension paper cable plant of the Okonite-Callender Cable Company at Paterson, N. J., in which his company is interested jointly with the Okonite company.

Arthur H. Halloran, publisher of Radio, San Francisco, has been elected president of the Pacific Radio Trade Association, succeeding **H. E. Metcalf.** He will serve also as chairman of the board of directors, made up of the following: **A. H. Rowe,** representing manufacturers; **J. P. Hermans,** manufacturers' agents; **C. R. Musladin,** electrical jobbers; **Ernest Ingold,** radio jobbers; **W. H. Jackson,** miscellaneous jobbers; **Clyde L. Chamblin,** electrical dealers; **J. B. Threlkeld,** radio dealers; and **R. D. Eastman,** miscellaneous dealers. **Mrs. E. H. Gray** was reappointed secretary.

E. J. Rosenauer, Western district auditor for the Byllesby Engineering & Management Corporation, spent a week with the San Diego Consolidated Gas & Electric Company, San Diego, Calif., a short while ago.

C. R. Hunt of San Francisco, Western representative of Robbins & Myers, was in Los Angeles on business recently.

Samuel Kahn, for the past twelve years vice-president and general manager of the Western States Gas & Electric Company, Stockton, Calif., a Byllesby property, has been made vice-president and general manager of the Market Street Railway Company, San Francisco, also controlled by H. M. Byllesby & Company. He has resigned as general manager of the Stockton company but will retain the vice-presidency and also will serve on the board of directors. Mr. Kahn's experience in the utility field has been wide. In the ten years between his graduation from Purdue Universtity in 1903 and his joining the organization of the Western States company in 1913, he was connected with the San Antonio

SAMUEL KAHN

Gas & Electric Company, the San Antonio Traction Company, the Union Light, Heat & Power Company of Fargo, N. D., the Appalachian Power Company of West Virginia, and the Tacoma Gas Company, Tacoma, Wash. In addition to the offices mentioned, Mr. Kahn is a director of the Standard Gas & Electric Company, a Byllesby holding company, and vice-president of the Sierra & San Francisco Power Company, under lease to the Pacific Gas and Electric Company. In Stockton he was exceedingly active in community affairs, having been president of the Chamber of Commerce, a director for a number of years and chairman of its deep waterway committee, and a director of the Stockton Savings & Loan Bank. He is a native of San Antonio, Texas.

L. J. Brown has been appointed stores manager for the Western Electric Company in San Francisco.

Carl J. Erickson, vice-president and sales manager, Wells Manufacturing Company, San Francisco, who made a tour of the country in the interests of his concern, has returned.

E. D. Stewart has been made branch manager of the El Paso office of the Westinghouse Electric & Manufacturing Company that recently was consolidated with the office at Phoenix, Ariz. **W. G. Wilson** has been appointed local manager at Phoenix under Mr. Stewart's supervision.

J. H. Knost, formerly branch manager of the Westinghouse Electric & Manufacturing Company's office at Phoenix, Ariz., has been made industrial and power sales engineer for the Los Angeles district, with headquarters in Los Angeles.

A. H. Ellerman has joined the staff of the Wagner Electric Corporation at Kansas City, Mo.

Charles A. Semrad, vice-president and general commercial manager of the Public Service Company of Colorado and president of the Rocky Mountain Division, N.E.L.A., attended the national executive committee meeting of the N.E.L.A. in Chicago not long ago. **William C. Sterne,** head of the Municipal Properties Investing Company in Denver and chairman of the Rocky Mountain Information Committee, attended the meeting of the Public Relations Section of the N.E.L.A. at the same time. He was accompanied by his son **Charles Sterne.** Following the meetings they visited in Indianapolis, New York City and Washington.

A. L. Day, formerly line foreman at Hood River, Ore., for the Pacific Power & Light Company, Portland, has been appointed rural electric service man for that company in the same and contiguous districts. This is a newly created position in the commercial department of the company, and will embody work covering public relations and sales among rural customers and also the estimating of rural extensions.

C. J. Kruse, for some time a lineman at Hood River, Ore., for the Pacific Power & Light Company, Portland, has been promoted to be line foreman at that district, taking the place of **A. L. Day,** who has joined the commercial department of the company.

Joseph Moorehead, assistant director of publicity of the Mountain States Telephone & Telegraph Company, was named as one of the team captains in the annual membership drive of the Denver Y.M.C.A.

C. M. Brewer, in addition to his positions as vice-president and general manager of the Mountain States Power Company, Tacoma, and as director on the board of the Standard Gas & Electric Company, Chicago, has been appointed vice-president and general manager of the Tacoma Gas & Fuel Company, succeeding **D. J. Young,** who remains in consulting capacity on the staff of the Byllesby Engineering & Management Corporation.

H. L. Bargion, representative of the Washington Electric Supply Company, Spokane, recently visited San Francisco.

R. A. Hopkins, until recently manager of the engineering division in the Westinghouse Electric & Manufacturing Company's Los Angeles district, is now central station division manager. **J. C. Jones** has been appointed assistant manager of the central station division.

H. F. Hendrickson, office manager for Stone & Webster, Inc., has returned from the Baker River development in Washington to the Los Angeles office in connection with the addition to the Southern California Edison Company's Long Beach steam plant.

H. E. Sherman, vice-president and sales manager, Illinois Electric Company, and **J. H. Jamison,** merchandising manager, Westinghouse Electric & Manufacturing Company, lately made an extended business trip through Arizona.

A. T. Richardson, for some time connected with the Wholesale Electric Company, San Francisco, has joined the staff of Birkel & Le Gassic, Santa Monica, Calif., as office manager.

James Eakins, formerly a commercial representative for the Public Service Company of Colorado, Denver, has been placed in charge of the newly organized radio department of that company.

L. L. Hennessy, superintendent of the order department, San Diego Consolidated Gas & Electric Company, won the silver cup at the Chula Vista Country Club golf tournament recently for the third successive time.

A. E. Holloway, superintendent of commercial department, San Diego Consolidated Gas & Electric Company, and president of the Chamber of Commerce of that city, attended the October meeting of the Southern California Regional Advisory Council, California Development Association in Pasadena. Mr. Holloway, who is chairman of the industrial committee of the latter organization, also attended the recent meeting of the Southern California Regional Cotton Conference at Riverside.

L. M. Cargo, manager Westinghouse Electric & Manufacturing Company, Denver, in October last completed thirty-seven years service with that company. **A. C. Cornell,** Western Electric Company manager in Denver and chairman of the Electrical League of Colorado, and **A. T. Slack,** one of the company's salesmen, were awarded twenty-year service buttons by that company.

G. H. P. Dellman, lighting sales engineer of the new business department, San Diego Consolidated Gas & Electric Company, attended the meeting of the Commercial Section executive committee, P.C.E.A., in San Francisco recently.

C. H. Robbins recently was selected as manager of the new electrical appliance department of Holzwasser, Inc., a large department store of San Diego, Calif. Mr. Robbins was formerly with the Hurley Machine Company as manager of its Thor Shop in Los Angeles.

L. J. Pospisil, E. H. Collins and **L. R. Gamble** of the engineering department, The Washington Water Power Company, Spokane, attended the recent A.I.E.E. meeting at Seattle.

H. S. Emanuels, of Fairbanks-Morse Company, **J. S. Davis,** chief engineer, Olympic Hotel, and **S. C. Lindsay,** engineer, Puget Sound Power & Light Company, recently became members of the Seattle Electric Club.

D. W. Chamberlain, of the Globe Electric Company, has been named treasurer of the Seattle Electric Club, succeeding **E. A. Irons,** of the Westinghouse Lamp Company, who recently resigned.

John F. Greenawalt, publicity director, Mountain States Telephone & Telegraph Company, served as chairman of the publicity committee of the recent drive conducted in Denver for the financing of the Sunshine Mission.

O. L. Mackell, chief clerk, Public Service Company of Colorado in Denver, had radio loud speakers installed in the company offices during the world series baseball games so that returns might be heard by customers and employees.

L. J. Bridger, Westinghouse lamp representative in the Mountain region, attended a company conference in St. Louis early in October and later visited one of the company factories in Milwaukee before returning to his headquarters in Denver.

A. F. Morairty, formerly assistant to the general superintendent of the Public Service Company of Colorado, Denver, has become commercial manager of the Central Arizona Light & Power Company, Phoenix. This is Mr. Morairty's second promotion in less than a year, for it was only about six months previous to his appointment to his present position that he was made assistant to the general superintendent of the Public Service Company. Prior to that he had been district manager for that company at Alamosa, Colo. He started his career in plant construction work with the Colorado Power Company, predecessor of the Public Service Company; he has been substation operator, steam plant

A. F. MORAIRTY

operator, system dispatcher, assistant local manager, local manager and district manager. Mr. Morairty always has taken an active part in the affairs of the electrical industry, particularly in N.E.L.A. work, and has played a prominent role in community and organizational activities such as those connected with social and welfare work and with the Chamber of Commerce, Rotary Club and the Boy Scouts. He was born in Boulder, Colo., in 1888, receiving his grade and high-school education in Denver and the degree of electrical engineer from the University of Michigan.

R. L. Hearn of the consulting firm of Acres & Hearn, Niagara Falls, Ontario, accompanied by Mrs. Hearn, visited Spokane and other points in the vicinity a short time ago. Until last spring Mr. Hearn was assistant chief engineer of The Washington Water Power Company, Spokane.

E. G. Moser, formerly chief operator at the Kalama River plant of the Puget Sound Power & Light Company, Seattle, has been transferred to the company's Baker River plant; **R. Morrow,** second shift operator at the Kalama River plant has been transferred to the Snoqualmie Falls plant, and **E. G. Teagarden,** formerly third shift operator, has been made chief operator at the Kalama plant.

Patrick Haffey, a member of the contract department staff of the Public Service Company of Colorado in Denver, received considerable publicity in the newspapers early in October when he was left a legacy by a wealthy St. Louis druggist with whom he was acquainted.

F. F. McCammon, manager of the power sales department of the Public Service Company of Colorado, represented **Clare N. Stannard,** vice-president and general manager of the company, and gave the address prepared by Mr. Stannard on "The Relation of Electricity to Agriculture" over KOA, General Electric broadcasting station in Denver when "Electric Night" was celebrated Oct. 21. **H. S. Robertson,** general manager of the Denver Tramway Company, also made an address. **Guy B. Hopkins** directed the Public Service Company band in a number of musical selections on the program.

Lars Langloe, reclamation engineer in the state department of conservation and development at Olympia, Wash., has resigned to take charge of reclamation development for the Riverview Farm Corporation of Seattle on Blalock Island in the Columbia River, near Patterson. Mr. Langloe has been with the department since 1921. His duties will be temporarily handled by R. K. Tiffany, supervisor of hydraulics.

G. H. P. Dellman, lighting sales engineer of the new business department, San Diego Consolidated Gas & Electric Company, San Diego, Calif., attended the recent Los Angeles meeting of the industrial lighting committee, N.E.L.A.

R. B. Bonney, chairman of the speakers bureau, and **George E. Lewis,** executive manager of the Rocky Mountain Committee on Public Utility Information, have organized the class in public speaking for utility employees in Denver. The class will continue for twenty weeks, one night weekly, under the tutorage of Prof. Bertrand Lyon.

Obituary

Roy Castle Greenfield, mining and mechanical engineer, for many years connected with the Allis-Chalmers Manufacturing Company, both in the United States and Mexico, died in Chicago, Oct. 28, after an illness of about two years.

Rush B. Morrow, engineer in the light and power department of the Portland Electric Power Company, died Oct. 4, 1925, after an illness lasting several months. He was born Feb. 29, 1884. During the war he saw eight months active service as a captain in the 37th Engineers, later having been promoted to the rank of major. He had been with the Portland company since 1920.

Stacy Hamilton, for some years assistant to the president of the Portland Electric Company, Portland, with the title of organization inspector, died Oct. 1, 1925, from a nervous disorder resulting in a species of paralysis. He had been ill some months. Born Jan. 21, 1886, he spent his boyhood in San Francisco and was at one time employed by the Western Electric Company there. In 1907 he went to Portland and took a position in the light and power department of the organization then known as the Portland Railway, Light & Power Company, being occupied with rate studies and statistical records. In 1920 he was transferred to the office of the president.

TRADE NOTES

The Pacific Electric Manufacturing Company, 5815 Third Street, San Francisco, has announced the opening of a Chicago office at 1001 McCormick Buildign, with G. B. Kirkwood in charge. The company makes a full line of high-tension equipment, including disconnecting switches, oil circuit breakers, high-voltage fuses and the like.

The Empire Lighting Fixture Company, Los Angeles, has announced the opening of a display room at Pasadena, Calif., in charge of J. J. May, resident manager. The company will continue to maintain its present showrooms at Los Angeles, Hollywood and Glendale.

The Easy Housekeeping Shop, Inc., Los Angeles, distributors of Easy washing machines, issues a monthly sales bulletin, "Easy Money—Breezy Notes for 'Easy' Salesmen," a four-page, mimeographed pamphlet, which is proving to be an excellent method of increasing monthly sales quotas.

Imperial Molded Products Corporation, Chicago, recently has been formed and will be controlled and financed by officers of the Imperial Brass Manufacturing Company. A large modern factory has been taken over by the new corporation for the production of molded Bakelite parts by high-pressure steam.

Harold E. Trent, Philadelphia, has produced a wide-tip soldering iron, designed to meet extreme requirements where a soldering iron is necessary for heavy work. It is made in two types, a spear shape and hatchet type.

Philadelphia Storage Battery Company, Philadelphia, now is occupying its new five-story concrete addition to its plant to provide facilities for the manufacture of its new product, Philco radio "A" and "B" socket powers.

The Brown Instrument Company, Philadelphia, has issued bulletin 1-13 illustrating and describing the Brown new design recording pyrometers.

The Hisey-Wolf Machine Company, Cincinnati, has issued bulletin No. 108, which describes the latest Hisey ⅝-in. capacity standard duty universal electric drill.

Kelvinator Corporation, Detroit, has developed a new ice cream electric cabinet. Preparations are under way for a large scale of production, a new factory having been equipped for handling the production.

Pyle-National Company, Chicago, has introduced a new floodlight projector design under type No. 2375 that is the latest addition to a complete line of cast aluminum floodlighting and locomotive headlight products.

The Esterline-Angus Company, Indianapolis, has issued a folder which is descriptive and illustrative of its "twin-type" meter.

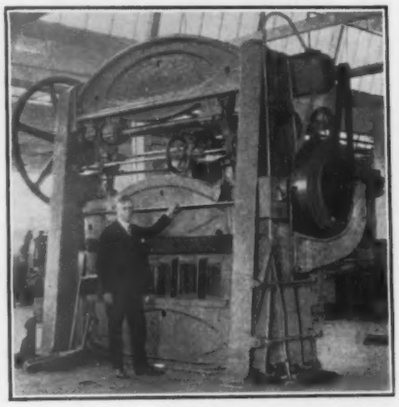
Bryant Electric Company, Bridgeport, Conn., has placed on the market No. 2957, a new combination "Spartan" outlet and tumbler switch. The device is similar to the familiar No. 117, but has a tumbler switch in place of the type "O" mechanism which the older type employed.

Harvey Hubbell, Inc., Bridgeport, Conn., has put on the market a new 30-amp. polarized flush receptacle.

Albert and J. M. Anderson Manufacturing Company, Boston, has issued bulletin No. 38, which is fully descriptive of the Anderson charging plugs and receptacles. The catalog also contains a full price list.

Groundulet Company, Newark, N. J., has made some new developments in its groundulet system, that it is claimed fulfill all requirements of the 1925 National Electrical Code. The same is described fully in the company's literature which may be obtained on request.

The Okonite Company, Paterson, N. J., has issued a new booklet entitled "The Story of Steel Taped Cable." The booklet is well illustrated with photographs.



A. E. Griswold, president of the A. G. Manufacturing Company of Seattle, as caught in unofficial pose by the inquisitive photographer. At first glance it might seem that Mr. Griswold is exhibiting apprehension at the possible souvenir-collecting propensities of the intruder and that he is hanging on to his pet plaything to prevent its being collected. Or it might be the "proud papa" instinct showing forth.

Delta-Star Electric Company, Chicago, has issued a 48-page bulletin containing complete descriptions and diagrams of its standardized unit-type bus-bar supports for standard, heavy-duty and extra heavy-duty service.

General Electric Company, Schenectady, has issued Bulletin KEK-10 on "Electric Railways and the American Public", which contains a collection of recent and forthcoming advertisements explaining the electric railways and their functions.

National Manufacturers Agencies, 1161 Market Street, San Francisco, has produced a new feature in electric waffle irons, known as the International automatic waffle baker, which contains a simple timing device that regulates automatically the length of time the waffle bakes. At the end of that time the top of baker automatically opens, which prevents burning and avoids the continual lifting up of the top to see if waffle is done.

The Cutler-Hammer Manufacturing Company, Milwaukee, has developed a new attachment plug which is said to incorporate several features of design and construction.

Edison Electric Appliance Company, Inc., Chicago, has placed several new percolator models on the market that are described and illustrated in their new catalog supplement No. A585.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, has produced a new combination disconnecting switch, fuse and choke coil, designed to reduce the size and weight of the combined unit as well as the number of insulators required for a given installation.

Killark Electric Manufacturing Company, St. Louis, is constructing a new factory building at 3940 Easton Avenue, which will cover 25,000 sq. ft. The new building is expected to be completed in January, 1926.

Brammer Washing Machine Company, Davenport, Iowa, successor to the White Lily Manufacturing Company and the H. F. Brammer Manufacturing Company, recently has started deliveries on its new washing machine, the "White Lily Ace" No. E 40 C, which it is claimed is a radical departure from anything previously marketed by either of the former companies.

The Western Electric Company office in Denver has been moved from 1425 Curtis Street to 18th and Blake Streets where a building has been converted for office and warehouse usage. The new location is in the wholesale district and has trackage facilities. Special stock arrangements at the new location will provide unusual counter service for Denver wholesale trade. The electrical layout of the new building, it is understood, is complete in every respect. A. C. Cornell is the Rocky Mountain district manager of the company.

Uehling Instrument Company, Paterson, N. J., has issued bulletins 118 and 118-A describing the Apex CO_2 recorder and indicator. These instruments operate on the orifice principle and do not employ chemical solutions. The principle of operation is fully explained in the bulletins.

The Reliance Electric & Engineering Company, Cleveland, has issued bulletin No. 4000 giving information on ball and roller bearing reliance motors. The bulletin is well illustrated with photographs.

The Trico Fuse Manufacturing Company, Milwaukee, has added the new giant fuse puller and replacer to its present model, the pocket-size tool. This new giant size model is described and illustrated fully in the literature the company will mail upon request.

The G. L. Halck Sales Company has been appointed the California, Oregon and Washington representative for the **Kant-Break Ladders, Inc.,** St. Louis, Mo. The company manufactures a line of electrician's, linemen's and general type ladders.

The Electric Supply Company of Oakland, Calif., has opened a branch at 1063 Howard Street, San Francisco. Mel Hirsch has been appointed the manager of the San Francisco branch office.

Electrical Development & Machine Company, Philadelphia, has issued a new folder illustrating and describing its insulating switch and other power equipment.